NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO:
3-76

For Release:
IMMEDIATE

Ralph B. Jackson
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747 SHUTTLE CARRIER AIRCRAFT CREW NAMED

The initial crew of the 747 Shuttle Carrier Aircraft that will be used to carry and launch the Space Shuttle Orbiter for its Approach and Landing Tests has been selected by NASA.

Fitzhugh L. Fulton, Jr., and Thomas C. McMurtry, both of NASA's Dryden Flight Research Center, Edwards, CA , will be the pilots. Flight test engineers on board the 747 will be Victor W. Horton, also of the Dryden Flight Research Center, and Louis E. Guidry, Jr., of the Johnson Space Center, Houston, TX. All of the men are civilians.

The ALT flights will be conducted here in early 1977. The specially modified 747 will carry the Orbiter to an altitude of approximately 7,500 meters (25,000 feet). The Orbiter will then separate from the 747 and the Orbiter crew will pilot the Orbiter to a glide landing. Several unmanned and manned captive flights will preceed the initial free flights.

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The 747 is currently being used in a wake vortex study and will be returned to Boeing Co. late this month for the modifications required to carry and launch the Orbiter.

Fulton is a veteran multi-engine test pilot and has extensive experience as a launch pilot. He served as launch pilot for the X-15 and manned lifting bodies as well as other experimental aircraft flight test programs. Fulton was an XB-70 project pilot for both NASA and the USAF. He is currently co-project pilot on the triple-sonic YF-12 flight research program

McMurtry has been flying experimental aircraft for NASA since 1967. As project pilot on the Supercritical Wing, he made the first flight with the new airfoil shape that can lower the operating costs of future jet transports. McMurtry has flown as co-project pilot on the Digital Fly-By-Wire aircraft and the Supercritical Wing F-111. He has also flown as co-project pilot on NASA's 990 and C-141 multi-engine aircraft.

At the Johnson Space Center, Guidry has flown as test engineer on the C-135 Zero-G studies and the C-130 Earth Resources aircraft. Horton is flight test engineer on the YF-12 at Dryden Flight Research Center and has flown as launch-panel operator of the B-52 air launch aircraft.

A back-up crew of Joe Algranti and A.J. Roy, Jr., both of the Johnson Space Center, will pilot the 747 on flights at a later date in the program.

-dfrc-

NASA News

National Aeronautics and
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Hugh L. Dryden Flight Research Center
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RELEASE NO: 5-76

FOR RELEASE: 12 noon PST
April 2, 1976

NEW DEPUTY DIRECTOR AT DRYDEN FLIGHT RESEARCH CENTER

Gerald D. Griffin, Deputy Associate Administrator for the Office of Space Flight and former Assistant Administrator for Legislative Affairs, will be the new Deputy Director of the Dryden Flight Research Center. The appointment is effective May 1.

Mr. Griffin has been at NASA Headquarters since April of 1973. He transferred to Headquarters from the Johnson Space Center where he had been a flight director on all of the 11 manned Apollo Missions and the Lead Director on Apollo 12, 15 and 17.

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A native of Athens, Texas, Mr. Griffin received his Aeronautical Engineering degree from Texas A&M in 1956. After four years in the USAF, he was an aeronautical engineer for the Lockheed Missiles and Space Co. and for General Dynamics.

Among his numerous awards are two NASA Exceptional Service Awards for his efforts as Flight Director for the Apollo 12 and 15 flights. He is an experienced private pilot, both fixed wing and helicopter.

The Griffins and their two children are expected to move to Lancaster in the near future.

-dfrc-

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RELEASE NO: 6-76

Ralph Jackson
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For Release: Wednesday, May 12
Also being released in
Huntsville, AL

AGREEMENT REACHED ON SHUTTLE PARACHUTE TEST PROGRAM

A Memorandum of Understanding has been signed by officials of two NASA Centers for a comprehensive test program to evaluate the parachute system for the Space Shuttle Solid Rocket Booster.

The agreement is between NASA's Dryden Flight Research Center, Edwards, CA and the Marshall Space Flight Center, Huntsville, AL, which is responsible for development of the Solid Rocket Booster.

The parachutes, each 36.5 meters (120 feet) in diameter, are the largest ever used in the space program. Parachutes used in the Apollo program were just over 24.5 meters (80 feet) in diameter.

The Space Shuttle, the primary carrier vehicle for America's Space Transportation System of the 1980s being developed by NASA, will emphasize the reusability of most of its components - the Orbiter, main engines and Solid Rocket Boosters.

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When the Shuttle flies, two Solid Rocket Boosters will be used for each launch. They will fire together with the Orbiter's three main engines to boost the vehicle from the launch pad to an altitude of about 43.5 kilometers (27 miles).

The Solid Rocket Boosters, which will be the largest ever flown, will then be jettisoned at burnout for descent by parachute to the ocean about 225 kilometers (140 miles) downrange. The boosters will be recovered, towed back to shore, refurbished, refueled and prepared for reuse.

Under terms of the agreement, there will be test drops of a weight to simulate a Solid Rocket Booster. The drops will be made from a B-52 aircraft over the National Parachute Test Range, one hour's flight from DFRC and Edwards Air Force Base.

The simulated booster will be defined by Marshall to be aerodynamically compatible with the aircraft. It will weigh slightly less than 22,680 kilograms (50,000 pounds), about one-third the weight of an empty or burned-out booster.

Dryden Flight Research Center will provide the aircraft, the flight and maintenance crews, and will perform the drop tests over the test area.

The test series will consist of drogue parachute tests and main parachute tests, most of which will use only one main parachute, but test deployment of the cluster of three main parachutes - the actual flight configuration - will be included.

Since the test vehicle weighs about one-third that of the actual booster, tests with one parachute will approximate flight conditions.

Data from the tests will be evaluated by engineers from the Marshall Center to determine the adequacy of the parachute recovery system.

The test vehicle will be designed by the parachute contractor who will also furnish the parachute test specimens. The contractor has not yet been selected.

According to current planning, the parachute recovery tests will begin in early 1977.

-dfrc-

5/7/76

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RELEASE NO: 7-76

For Release: IMMEDIATE
May 14, 1976

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NASA TO FLY YF-17

NASA's Dryden Flight Research Center, Edwards, CA is scheduled to begin a series of flights of the YF-17 aircraft which will aid the designers of future highly maneuverable aircraft.

The YF-17 is a twin-engine aircraft incorporating many new, inovative concepts which help give it high performance and maneuverability. It was built by the Northrop Corporation for the USAF Lightweight Fighter Program. The US Navy F-18 fighter which will be built by McDonnell Douglas and Northrop is a derivative of the YF-17.

There are two prime objectives of the NASA research program. The first calls for the collection of in-flight pressure data around the afterbody of the aircraft and the engine nozzles. This data will then be compared with wind tunnel predictions in an effort to improve wind tunnel prediction techniques which will be used in the design of future fighter-type aircraft, particularly aircraft with twin-turbofan engines.

The second objective is to continue the NASA flight research studies pertaining to improved maneuvering capabilities for fighter aircraft. These studies include buffet, stability and control, acceleration capabilities and handling qualities.

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NASA will fly the YF-17 for approximately eight weeks under a $255,000 contract funded by NASA and the U.S. Navy. The first flight is scheduled for mid-May, and will be piloted by Gary Krier, YF-17 project pilot for the NASA Dryden Flight Research Center.

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5/14/76

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Mountain View, CA

July 12, 1976

OBLIQUE WING FLIGHT TESTS SCHEDULED

NASA engineers will soon begin flight-testing a unique remotely controlled aircraft which can fly with the wing at various oblique angles to the flight path.

The flight test program is a joint effort of NASA's Dryden Flight Research Center, Edwards, CA and NASA's Ames Research Center at Mountain View, CA.

The small aircraft, called an RPRV (Remotley Piloted Research Vehicle), is scheduled for its first flight on August 6 at the Dryden Flight Research Center. Purpose of the flight program is to verify theoretical, wind tunnel and flight simulator studies made at Ames for flight characteristics of oblique wing aircraft.

The oblique wing RPRV is equipped with instrumentation to record the flight characteristics of the aircraft and is the first oblique wing aircraft to fly so equipped. The information recorded by the instrumentation will allow research scientists to verify analytical methods developed to calculate the flight characteristics of these advanced technology aircraft.

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Dr. Robert T. Jones, senior scientist at Ames, has proposed the oblique wing as a concept for supersonic aircraft of the future to help alleviate the sonic boom problem and to increase the energy effectiveness of supersonic aircraft. Jones proposed transport aircraft with a pivoting straight wing mounted on the top of the fuselage. The wing can be turned to various oblique angles for best performance at different flight speeds. For slower flight, the wing is positioned at right angles to the fuselage, allowing landings and takeoffs with a minimum of power and much less noise than present day supersonic transports. For higher speeds, the wing is rotated with respect to the fuselage to gain the high speed efficiency of the swept wing design.

Studies have indicated that an oblique wing transport airplane flying at 1000 mph would achieve about twice the fuel economy of either the British-French Concorde or the Russian SST.

The oblique wing RPRV to be tested represents a low-cost approach to early assessment of advanced technology. It has a wing span of 6.7 meters (22 feet), weighs 400 kilograms (900 pounds) and is powered by a four-cylinder, 90 horsepower engine. The wing angle relative to the fuselage can be varied during flight. Wing angles up to 45 degrees will be tested. The RPRV is flown from a ground cockpit by radio control. A television camera mounted in the aircraft's nose gives the pilot on the ground a "pilot's eye" view.

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The RPRV technique was developed by engineers at the Dryden Flight Research Center as a highly cost-effective means of flight testing high-risk technology without the associated risks to the test pilots. It involves flying large-scale models of the test aircraft by a test pilot located in a ground cockpit complete with flight controls and instruments. The pilot is able to fly the model through the desired test maneuvers using radar, television and telemetry.

First application of the new technique was spin testing of a 23-foot model of the USAF F-15 fighter.

7/12/76

NASA News

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Trudy Tiedemann
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Release Date: IMMEDIATE
August 23, 1976

Release No: 14-76

NASA TO BEGIN PHASE II FLY-BY-WIRE FLIGHT TEST PROGRAM

In anticipation of requirements of a new generation of aircraft, NASA is applying space technology to develop a flight control system which could provide major advantages over conventional aircraft control systems through reduced fuel consumption, increased passenger-carrying capacity and smoother flight performance.

Called Digital Fly-By-Wire, the control system is scheduled for its first flight on a modified F-8 jet aircraft on August 27 at NASA's Dryden Flight Research Center, Edwards, California.

Project pilot Gary Krier will be at the controls for Friday's flight, which will checkout the primary and analog backup systems. According to project manager Cal Jarvis, the program is expected to last through 1978, with approximately 30 flights planned.

The conventional aircraft control systems in the F-8 are replaced by lightweight wires to translate pilot signals to the aircraft control system. Three digital computers are used for primary control, and a three-channel analog system is available for emergency control if the digital system fails.

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System flight testing on the F-8 aircraft will mark the second phase of the test program begun at the Dryden Flight Research Center in 1972.

During the first phase of the program, the same modified F-8 had its mechanical flight control system removed and replaced with several sets of electrical wire bundles, leading from the pilot's control stick to a single digital computer in the aircraft and then to the aircraft control surfaces.

The single channel digital computer used in Phase I was originally developed for the flight control system of the Apollo lunar module. Forty-two flights were accomplished with this system, establishing the feasibility of digital fly-by-wire systems for aircraft.

During Phase II, the triplex digital system will undergo flight testing to evaluate the practicality of design concepts for multi-channel operation.

Aircraft manufacturers' studies have indicated that digital fly-by-wire systems are essential to the application of active control concepts which directly reduce aircraft aerodynamic loads and permit design of lower weight, therefore more economical, aircraft. This results in more efficient flight control systems and more effective aircraft. The Air Force has determined that future bombers and fighters could be up to 20% lighter, with production cost savings up to 10% through use of fly-by-wire technology.

The Phase II F-8 DFBW triplex system also utilizes several system concepts similar to those employed by NASA's Space Shuttle. Because of their similarities, it is planned to

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modify and flight-test certain Shuttle software modules using the F-8 system. The same digital computers employed in the F-8 are also being utilized in the Shuttle system. The entire test program should help in the development and flight-verification of a redundant, digital fly-by-wire system applicable to Shuttle applications, as well as advanced transport applications.

Software for the triplex digital system was developed by the Charles Stark Draper Laboratories in Cambridge, Massachusetts, using AP-101 computers supplied by IBM Federal Systems Division in Owego, New York. The analog, Computer By-Pass System was developed by Sperry Flight Systems, Phoenix, Arizona, and the electronic control actuators were supplied by the Hydraulic Research and Manufacturing Company, Valencia, California.

-dfrc-

8-23-76

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For Release: IMMEDIATE

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NASA STUDIES IMPACT OF INSECTS ON AIRCRAFT

NASA is literally trying to work the bugs out of aircraft.

Engineers and pilots at NASA's Hugh L. Dryden Flight Research Center at Edwards, California, are flying a small jet transport equipped with a modified wing, to study various materials and methods that will prevent insect impacts from sticking to the leading edge of aircraft wings.

The program is being jointly conducted with NASA's Langley Research Center, Hampton, Virginia, and is part of the overall NASA Aircraft Energy Efficiency Program which is aimed at developing a 1958 transport with a potential 20-40 percent fuel savings.

The advanced long range aircraft will probably utilize laminar flow control technology and is dependent upon smooth air flow over the wings. However, it has been found that impacted insects which stick to the leading edge of the wing can trip the air flow and cause the

-more-

flow to become turbulent. This would cancel out the increase that would be possible with laminar flow.

Two teflon-coated panels, two panels with a coating similar to that on aircraft windshields and one bare aluminum panel, all approximately 18 inches wide, have been installed on the leading edge of the test aircraft. Instrumentation probes have also been installed above the panels. These probes will be used to determine if there is a change in the air flow (from laminar to turbulent) resulting from the insects which adhere to the panels. Due to the different coatings on the five panels, it is expected that the number of impacted insects which stick to the leading edge and the resultant air flow will vary from panel to panel.

On the lower surface of the leading edge, washer nozzles for a pressurized water system have been located every four inches. On certain flights, the water system is activated to determine its effect on washing off the insects in flight.

On a typical flight, the aircraft flys low over the alfalfa fields and sewage ponds, etc., to impact a large number of insects. The aircraft then lands and the insect impacts on the various panels are documented and measured. The aircraft then takes off and climbs to a high altitude, high speed cruise condition where the effects of the impacts can be determined on the air flow.

-dfrc-

11/76

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MEMO TO EDITORS:

SHUTTLE ALT PRESS ROOM TO OPEN FEBRUARY 8

The NASA Press Center for the Space Shuttle Approach and Landing Tests (ALT) will open February 8 (not February 14, as was previously announced). The first taxi tests with the mated Shuttle Orbiter 101 and the 747 carrier aircraft are currently planned for no earlier than February 9. The first captive flight of the mated vehicles is presently scheduled for no earlier than February 17.

The Press Center is located at NASA's Dryden Flight Research Center, Edwards, California. For accreditation, respond on company letterhead to:

Ralph Jackson
Public Affairs Office
Dryden Flight Research Center
Edwards, CA 93523
Phone: (805) 258-8381

For updated information on ALT schedules, changes, time, etc. call (805) 258-4474.

-dfrc-

2/1/77

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NOTE TO EDITORS:

News media wanting to pickup the NASA public release line (Shuttle Orbiter Approach and Landing Tests V-2 Shuttle Circuit) should call:

East Coast: A/C 305-867-7110

West Coast: A/C 213-354-6000 (Ask for Bill Carpenter)

2/17/77

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RELEASE NO: 11-77

RELEASE DATE: Immediate
Also being released in
Washington, D.C.

SHUTTLE CONTROL SYSTEM SIMULATION FLIGHTS SCHEDULED

Inflight simulation of portions of NASA's Space Shuttle Orbiter computer flight control system will be done this week at the NASA Dryden Flight Research Center, Edwards, California, using a specially modified F-8 jet aircraft.

Purpose of the flights, which will simulate the maneuvers the Orbiter will perform following separation from the 747 Shuttle Carrier Aircraft (SCA) this summer, is to gather data to support the Shuttle's backup flight control system software.

The flight control system in the F-8, called Digital Fly-By-Wire (DFBW), is very similar to the primary and backup control system in the Shuttle. The conventional mechanical control systems in the aircraft have been replaced by lightweight wires and electronics to translate pilot signals to the aircraft control system. Three digital computers are used for primary control, and a three-channel analog system is available for emergency control if the digital system fails.

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Both the F-8 and Orbiter use similar models of the same digital computer. Parts of the Orbiter computer's logic for detecting failures of sensors, such as rate gyros, accelerometers and pilot stick position, have been programmed on the F-8 DFBW computers.

The F-8 will be flown along a flight path which follows a race-track pattern, with the simulated separation of the 747/Orbiter occurring about eight miles to the right and parallel to the landing runway on the dry lakebed. After the separation point, the F-8 pilot will perform a series of test maneuvers, similar to those which the Orbiter pilot will perform, to obtain data on the flight control system.

Data will be recorded and analyzed after the flight to determine the effect of pilot maneuvers and turbulence on the computer's ability to detect failures and avoid giving false alarms.

The F-8 pilot will then initiate the first of two 90-degree turns to the left which will align the aircraft with the lakebed runway at an altitude of 6500 feet, about nine miles from the point where the Orbiter would touch down. A preflare maneuver will be made at an altitude of 900 feet.

In the case of the Orbiter, the landing flare would be initiated at an altitude slightly less than 100 feet. The F-8 pilot, however, will make a low pass at approximately 50 feet, go around and perform several more Orbiter free flight simulations.

Data from the flight tests will yield information about the reasonability of sensor fault thresholds which determine how much a single sensor can differ from the others before it is declared failed.

Three flights are scheduled this week on Thursday and Friday. The first will be piloted by Tom McMurtry, co-project pilot on the

-more-

Digital Fly-By-Wire program, and the second by DFBW project pilot Gary Krier. McMurtry will simulate free flights one, three and five in the third phase of Approach and Landing Tests (ALT) to be conducted this summer, and Krier will fly flights two and four.

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3/15/77

Trudy Tiedemann
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(APR 14/77, K5?)

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NASA News

National Aeronautics and
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1 April 1977

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NASA TO EXPAND AIRCRAFT BUG STUDY

In an effort to gain more information on the effect of insect impacts on the leading edge of aircraft wings, a small jet transport flying out of NASA's Hugh L. Dryden Flight Research Center at Edwards, California, will be flown at the Kennedy Space Center in Florida early in April to seek out bigger and more varied types of insects.

The program is being jointly conducted with NASA's Langley Research Center, Hampton, Virginia and is part of the overall NASA Aircraft Energy Efficiency Program which is aimed at developing a 1985 transport with a potential 20 to 40 per cent fuel savings.

The advanced long range aircraft will probably utilize laminar flow control technology and is dependent upon smooth air flow over the wings. However, it has been found that impacted insects which stick to the leading edge of the wing can trip the air flow and cause the flow to become turbulent. This would cancel out the increase which would be possible with laminar flow.

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The small jet transport, equipped with a modified wing, has been flying in the Southern California area over alfalfa fields and sewage ponds, etc., to impact a large number of insects. On a typical flight the aircraft then lands and the insect impacts on several specially coated panels on the wing are documented and measured. The aircraft is then flown to a high altitude, high speed cruise condition where the effects of the impacts can be determined on the air flow.

It is hoped that by flying in the Kennedy Space Center area in Florida and possibly in June or July at the Johnson Space Center in Houston, Texas, a different type, size or quantity of insects can be encountered, and more extensive testing can be done on materials and methods which will prevent insect impacts from adhering to the leading edge of the wings.

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4/1/77

APR 25/77

NASA News

National Aeronautics and
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RELEASE DATE: Monday, April 25
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Washington, D.C.

NASA FEATURES FIRST FEMALE COMMENTATOR FOR SHUTTLE FLIGHTS

Ever since the early days of manned space flight, listeners have been accustomed to hearing a deep male voice describe the countdown to launch and other flight information.

However, with the recent beginning of the flight test program of the National Aeronautics and Space Administration, listeners heard the voice of a female commentator, Trudy Tiedemann.

As a professional Public Information Specialist at NASA's Hugh L. Dryden Flight Research Center for the past several years, Miss Tiedemann can explain what a flutter check is, or an aileron doublet, or a special rated thrust setting.

As commentator for the Approach and Landing Tests of the Space Shuttle, she sits in the control room along with the flight test engineers who are conducting the tests. It is her job to describe

-more-

to the listening general public and news media, via both audio and television, what is happening during the flight and to interpret the conversation between the pilots and ground controller.

If something goes wrong, she is the official spokesperson who will give out the first word.

And she has the qualifications to invade this up to now seemingly male domain. For the past several years she has written news releases about airplanes that have wings which swivel in flight, or that have computers for control systems. She began her professional career describing the flight test program of the lifting bodies, a series of aircraft which had no wings at all.

Miss Tiedemann has arranged press interviews with happy test pilots following the successful completion of their flights, and has also witnessed the fatal accident of one of them.

To prepare herself for this unusual assignment, Miss Tiedemann has studied the various technical manuals for both the Orbiter and the 747 which is used to carry the Shuttle. She attends the technical and crew briefings which are held for each flight.

The Approach and Landing Tests are divided into three phases. The first phase, completed in March at NASA's Dryden Flight Research Center, consisted of carrying the unmanned Orbiter on top of the specially modified 747. The second phase, now scheduled for late May, calls for the Orbiter to be manned by its two-man astronaut crew. The final phase consists of the Orbiter being air-launched from the 747 and then being flown to a landing here.

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It is probably most appropriate that the commentator for the Shuttle flight tests should be a female, as there is an excellent chance that when the Shuttle becomes operational in the 1980's, some of the crew or scientists on board will be women.

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Jennings

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NASA CONTINUES WAKE VORTEX STUDIES

The National Aeronautics and Space Administration is continuing its in-flight tests aimed at reducing the hazards of trailing wake vortices of large aircraft.

Wake vortices are the normally invisible flows of turbulent air that stream in a circular or funnel-shaped flow from the wing tips of large aircraft. Strong vortices generated by large transports and wide-body aircraft are a potential hazard to smaller aircraft, particularly during take-off and landing.

NASA's Dryden Flight Research Center, Edwards, California, has awarded a $104,300 cost-plus-fixed-fee contract to the Lockheed Aircraft Corporation, Burbank, California, to provide an L-1011 wide-body tri-jet aircraft for seven months, with approximately ten one-hour flights planned. The L-1011 will be equipped with eight smoke generators which will be used to mark the vortices in flight.

This series of tests will be used to study the effectiveness of different combinations of spoilers (the panels on the wings which are extended for braking) in dispersing wake vortices. A specially instrumented probe aircraft will be flown through the wake at different distances behind the L-1011 to assess the severity of the wake and measure its velocity, size and intensity at various trailing locations.

-more-

Previous tests conducted by the Dryden Flight Research Center with a four-engine 747 (the same 747 used for the Approach and Landing Tests of the Space Shuttle) indicated it was possible to disperse wake vortices by extending the outboard spoilers on each wing. The L-1011 studies will be used to confirm the fact that this same technique also applies to tri-jet aircraft.

5/77

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May 25, 77

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NEW HIGH SPEED AUTO PILOT DEVELOPED

Engineers at NASA's Dryden Flight Research Center, Edwards, California, have developed an autopilot that will permit future high speed, high altitude aircraft to fly much closer on flight path. The autopilot was developed during flight tests of the 2000 mph YF-12 aircraft that NASA is flying to aid in the development of technology for the design of future high speed aircraft.

Experience gained from the YF-12, XB-70 and other aircraft that cruise at high speeds and high altitudes indicates that deviations from planned speeds and altitudes can be quite extreme. Altitude changes of plus or minus 4000 feet and speed differences of over 30 mph have been reported.

With the aircraft cruising at Mach three (three times the speed of sound), the gradual temperature and pressure changes across the country appear as rapid changes. Since Mach number is a function of temperature and pressure, this rapid change can result in Mach change. Using conventional techniques to correct for these changes can result in large altitude deviations and poor passenger ride qualities.

If future aircraft are to operate at these speeds and altitudes, much closer tolerances will be required for air traffic control purposes.

-more-

These deviations can also result in loss of aircraft performance or exceeding the operating limits of the aircraft.

Conventional aircraft autopilots use flight control surface movement to maintain speed or altitude. However, this method will not work at the higher altitudes and speeds. Automatic throttle control is generally limited to lower speeds.

The YF-12 system combines both surface motion and throttle motion for control. Up to this time, the two systems have not been used together at the high speeds and altitudes.

On the YF-12 the two systems, along with newly developed data sensors, have functioned in a complimentary fashion which has enabled the YF-12 to maintain a high degree of flight path control precision even at high speed cruise conditions over extended periods of time.

-dfrc-

5/25/77

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GRIFFIN NAMED DEPUTY DIRECTOR OF NASA'S KENNEDY SPACE CENTER

Gerald D. Griffin, currently Deputy Director of NASA's Hugh L. Dryden Flight Research Center at Edwards, California, has been named Deputy Director of NASA's Kennedy Space Center in Florida. He will assume the position about July 1, replacing Miles Ross, who resigned from NASA in May.

Before becoming Deputy Director of DFRC in 1976, Griffin served for three years at NASA Headquarters, first as Assistant Administrator for Legislative Affairs and later as Deputy Associate Administrator (Operations) in the Office of Space Flight. At the Johnson Space Center, Houston, Texas, Griffin was a flight controller during the Gemini Program, a Flight Director on all eleven Apollo missions and Lead Flight Director on Apollo 12, 15 and 17.

Griffin has received numerous awards for his NASA service, among them, two NASA Exceptional Service Medals for his work on Apollo 12 and 15, the Presidential Medal of Freedom Group Achieve-

-more-

ment Award for Apollo 13 and the NASA Headquarters Creative Management Award.

Griffin is married to the former Sandra Jo Huber of Kerrville, Texas. They are the parents of one son and one daughter.

-dfrc-

5/27/77

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
Hugh L. Dryden Flight Research Center

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NASA News

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RELEASE NO: 21-77

RELEASE DATE: Immediate
Also being released at the
Marshall Space Flight Center,
Alabama

Ralph B. Jackson
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NASA TO CONDUCT SHUTTLE PARACHUTE TEST PROGRAM

The parachutes that will be used to recover the reusable Space Shuttle Solid Rocket Boosters will be drop tested by NASA's Dryden Flight Research Center, Edwards, California. The drop tests will be conducted over the National Parachute Test Range at El Centro, California.

NASA's Marshall Space Flight Center (MSFC), Huntsville, Alabama, is responsible for development of the Solid Rocket Boosters that are used to help launch the Space Shuttle Vehicle. Martin Marietta Corporation, Denver, Colorado, is contracted to MSFC for development of the recovery parachute system.

The Space Shuttle, the primary carrier vehicle for America's Space Transportation System of the 1980's being developed by NASA, will emphasize the reusability of most of its components - the Orbiter, main engines and Solid Rocket Boosters.

When the Shuttle flies, two Solid Rocket Boosters will be used for each launch. They will fire together with the Orbiter's three main engines to boost the vehicle from the launch pad to an altitude of about 43.5 kilometers (27 miles). The Solid Rocket Boosters, which will be the largest ever flown, will then be jettisoned at burnout for descent via parachute into the ocean about 225 kilometers

-more-

(140 miles) downrange. The boosters will be recovered, towed back to shore, refurbished, refueled and prepared for reuse.

The drop test program consists of a series of air drops using full scale flight-type parachutes to provide the necessary data for evaluating designs, deployment processes, parachute performance and parachute structural integrity. Two configurations of Drop Test Vehicles (DTV) will be utilized and dropped from the B-52 carrier aircraft. They will be used to provide various combinations of limit and overload conditions for the drogue and main parachutes at reefed and full open canopy shapes. The test series will consist of drogue and main parachute tests, most of which will use only one main parachute; but testing of the cluster of three main parachutes - the actual flight configuration - will be performed.

The simulated booster was defined by Marshall Space Flight Center to be aerodynamically compatible with the B-52 carrier aircraft. It weighs slightly less than 22,680 kilograms (50,000 pounds), about one-third the weight of an empty or burned out booster.

Dryden Flight Research Center is providing the B-52 aircraft, the flight and maintenance crews, and will perform the drop tests at El Centro, California.

Data from the tests will be evaluated by engineers from the Marshall Center and Martin Marietta Corporation to determine the adequacy of the parachute recovery system.

-dfrc-

6/1/77

NASA News

National Aeronautics and
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FOR RELEASE: Immediate

Ralph B. Jackson
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NOTE TO EDITORS

The first manned captive flight of the Space Shuttle Orbiter has been delayed from June 9 for one to two weeks. The exact date is dependent upon successful completion of ground tests currently underway at NASA's Dryden Flight Research Center, Edwards, California.

The postponement is due to a malfunction that occured during June 2 testing of the Orbiter's auxiliary power system.

-dfrc-

6/3/77

NASA News

National Aeronautics and
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Hugh L. Dryden Flight Research Center
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Washington, D.C.

August 2, 1977

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NOTE TO EDITORS:

SHUTTLE ORBITER FREE FLIGHT EVENTS SCHEDULED

The first Approach and Landing Test free flight of the Space Shuttle Orbiter is scheduled for August 12 at 8 a.m. PDT.

The NASA News Center at Dryden Flight Research Center at Edwards, California will open at 8 a.m. PDT on Monday, August 8 (T-4). The News Center telephone number is (805) 258-8381.

The following briefings have been scheduled for August 11 (T-1):

9 a.m.	Pre-Mission Briefing (Free Flight) Deke Slayton, Manager ALT Program, JSC John Young, Chief Astronaut Office, JSC
10:30 a.m.	Media Logistics Briefing
11:00 a.m.	Space Transportation System Operations (Payloads, pricing policy, users, etc.) Chet Lee, Director STS Operations, NASA Hq.

-more-

1:30 p.m. Orbiter Systems
Aaron Cohen, Manager Orbiter Project, JSC

Media Accreditation

August 8-9 Dryden News Center

August 10-12 Desert Inn Motel (Room 129)
44219 Sierra Highway
Lancaster, California
(805) 948-0942

For advanced accreditation contact:

Public Affairs Officer
NASA Dryden Flight Research Center
Edwards, CA 93523
(805) 258-8381

STATUS REPORTS

Recorded status reports on Shuttle ALT activities are available by calling (213) 354-4213 (Los Angeles) or (805) 258-4474 (Edwards).

-30-

8/2/77

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
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AC 805 258 3311

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Aug 2, 1977

Ralph Jackson
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GILLAM SELECTED AS DEPUTY DIRECTOR FOR NASA DRYDEN FLIGHT RESEARCH CENTER

Isaac Thomas Gillam IV has been named Deputy Director of the NASA Dryden Flight Research Center at Edwards, California. He was formerly Director of Shuttle Operations for the Approach and Landing Tests (ALT) of the Space Shuttle currently underway here.

Gillam, 45, replaces Gerald D. Griffin, who is now Deputy Director of NASA's Kennedy Space Center in Florida.

Prior to coming to Dryden in 1976, Gillam was Program Manager of Small Launch Vehicles for NASA Headquarters. He first joined NASA in 1963 after a 10 year tour of duty in the U.S. Air Force as a pilot and missile launch crew commander.

After graduating from Howard University, Washington, D.C. with a Distinguished Military Student Award, Gillam attended Tennessee State University while working on graduate studies and serving as Assistant Professor of Air Science. Among other awards, Gillam

-more-

has received the NASA Distinguished Service Medal for the Launch Vehicle Program.

Born in Little Rock, Arkansas on February 23, 1932, he is married to the former Norma Hughes of Dallas, Texas. The couple and their four children reside in Lancaster, California.

8/2/77 -dfrc-

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21 Sept 77

RELEASE NO: 30-77 RELEASE DATE: Immediate

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SHUTTLE COST SAVINGS AWARD PRESENTED

A $780,000 savings to NASA's Space Shuttle program has resulted in a $5000 Incentive Award for two employees of NASA's Dryden Flight Research Center.

John G. McTigue and Stanley Markey shared the award for their role in developing the overland transportation route of the Shuttle Orbiter from its Rockwell manufacturing site in Palmdale, California to the Dryden Flight Research Center, where it is currently undergoing approach and landing flight tests.

The original plan called for the Shuttle Orbiter to be ferried onboard the 747 Shuttle Carrier Aircraft from Palmdale to Dryden. This would have required the construction of a Mate/Demate Device at Palmdale at a cost of $2.53 million.

Using their extensive knowledge of local terrain, geography and personnel, McTigue and Markey were able to develop a land route which has permitted the Orbiter to be trucked to Dryden with relatively minor problems.

-more-

Cost of the overland route is currently estimated at approximately $1.7 million, as compared with the $2.5 million cost for construction of a Mate/Demate Device at Palmdale. The overland route thus represents a cost savings to the government of approximately $800,000.

9/21/77

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Ralph B. Jackson
Dryden Flight Research Center, Edwards, California
(Phone: 805 258-3311)

For Release
IMMEDIATE

Mary Fitzpatrick
Headquarters, Washington, D.C.
(Phone: 202 755-8370)

RELEASE NO: 34-77

DRYDEN DIRECTOR DAVID SCOTT TO LEAVE NASA

Dr. David R. Scott, director of Dryden Flight Research Center, Edwards, Calif., will resign from NASA Oct. 30 to enter private business in Los Angeles.

Isaac T. Gillam, deputy director at Dryden, will serve as acting director until a successor to Scott is announced.

Scott was appointed director of Dryden April 18, 1975, and previously had served as deputy director since August 1973. He retired as a colonel from the U.S. Air Force in March 1975.

As a NASA astronaut, Scott flew on Gemini VIII, Apollo 9 and was spacecraft commander of Apollo 15. When he left the astronaut corps in 1972, Scott was named technical assistant to

-more-

the Apollo Program Manager at Johnson Space Center in Houston. Later he served as special assistant for mission operations and government funded equipment.

On the Gemini 8 mission in 1966, Scott and Command Pilot Neil Armstrong performed the first successful docking of two vehicles in space. As command module pilot for Apollo 9 in 1969, Scott was instrumental in completing the first comprehensive Earth orbital qualification and verification test of a "full configured Apollo spacecraft." In 1971, he commanded the fourth manned lunar landing mission, Apollo 15.

Scott is a Fellow of the American Astronautical Society; Associate Fellow of the American Institute of Aeronautics and Astronautics; a member of the Society of Experimental Test Pilots; and Tau Beta Pi, Sigma Xi and Sigma Gamma Tau.

Among Dr. Scott's special honors are two NASA Distinguished Service Medals, the NASA Exceptional Service Medal, two Air Force Distinguished Service Medals, the Air Force Distinguished Flying Cross, the Air Force Association's David C. Schilling Trophy and the Robert J. Collier Trophy for 1971.

NASA News

National Aeronautics and
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Dryden Flight Research Center
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RELEASE NO: 37-77

SHUTTLE ORBITER FERRY TEST FLIGHTS PLANNED

Four ferry test flights of the Space Shuttle Orbiter *Enterprise*, mated to the Boeing 747 Shuttle Carrier Aircraft (SCA), have been scheduled for November 14, 15, 17 and 18 at NASA's Dryden Flight Research Center.

The flights will be made to measure the performance of the mated combination with a three degree forward angle between them. Previous flights were flown with a six degree angle.

Data gathered will be used for planning the first ferry flight, now scheduled for March 1978, when Orbiter Vehicle 101 (the *Enterprise*) will be transported atop the 747 to the NASA Marshall Space Flight Center in Huntsville, Alabama, for ground vibration tests.

Subsequent ferry flights will transport future Orbiters to NASA's Kennedy Space Center in Florida where they will be launched

-more-

into space following their construction at the Rockwell International facility, Palmdale, California. After the first four orbital flights, which will be recovered at Dryden, the Orbiter used in those tests will also be returned to Kennedy atop the SCA.

In subsequent flights, the Orbiters will return and land at the Florida Center.

In addition to determining what the best speed and altitudes are for ferry flight configuration, other test conditions to be explored include holding pattern performance and engine-out performance, both in cruise and the landing/takeoff pattern. The first flight will primarily examine buffet and flutter on the SCA's horizontal tail.

Maximum speed for the series of four ferry flight tests should be approximately 450 mph, peak altitude will be 26,000 feet, and top take-off weight will be 710,000 lbs.

Crew for the 747 will be Fitzhugh Fulton, SCA commander, and Tom McMurtry, SCA pilot. Flight engineers will be Victor Horton and Skip Guidry. The four were members of the prime crew who flew most all of the approach and landing test flights, completed on October 26, 1977.

The NASA Johnson Space Center, Houston, is responsible for the design, development and testing of the Space Shuttle Orbiter.

11-7-77

NASA News

National Aeronautics and
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Hugh L. Dryden Flight Research Center
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AC 805 258-3311

RELEASE NO: 40-77 RELEASE DATE: Immediate

[see AA 76, Nov 23]

Trudy Tiedemann
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NASA STUDIES BUG IMPACT EFFECTS IN AIRPORT ENVIRONMENTS

To further its study of the effect of insect impacts on the leading edge of aircraft wings, NASA's Dryden Flight Research Center at Edwards, California has been flying a small jet transport from commercial airports to study the effect of these impacts on long range flights.

The flights were made from four airports - Los Angeles, San Francisco, Sacramento and San Diego - to study the actual environment from which long range commercial flights will be made.

The tests are part of the overall NASA Aircraft Energy Efficiency Program which is aimed at developing a 1985 transport with a potential 20 to 40 percent fuel savings.

The advanced long range aircraft will probably utilize laminar flow control technology and would be dependent upon smooth air flow over the leading edge of the wings and it appears that insect impacts do cause this air flow to become turbulent. This would

-more-

cancel out the increase in fuel savings that would be possible with a laminar flow aircraft.

The test aircraft has been equipped with a modified wing leading edge made up of five panels of different materials to study the change in air flow (from laminar to turbulent) made by the insects adhering to the panel surfaces. A water cleaning system has also been installed to determine its ability on either washing off or keeping off insects during take-offs and climb to altitude.

In order to encounter as many different types, sizes and quantities of bugs as possible, the aircraft has been flown over alfalfa fields and sewage ponds, and at NASA Centers in Florida and Houston.

Statistical data gained from these flights indicates that some sort of washing system would be required to alleviate the effect of the insect impacts on a laminar flow surface, according to Bob Baron, project manager for Dryden Flight Research Center.

The program is being jointly conducted with NASA's Langley Research Center, Hampton, Virginia.

12/2/77

NASA News

National Aeronautics and
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Hugh L. Dryden Flight Research Center
P.O. Box 273
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AC 805 258-3311

RELEASE NO: 1-78

RELEASE DATE: February 20, 1978

Also being released in
Washington, D.C.

Ralph Jackson
(805) 258-8381

NASA TO FLIGHT TEST EXPERIMENTAL PIVOT-WING AIRCRAFT

NASA's Dryden Flight Research Center has awarded a $218,000 fixed-price contract to the Ames Industrial Corporation, Bohemia, NY for the development and fabrication of a small, lightweight, manned, oblique wing aircraft.

Because the pivoting oblique wing concept is a significant departure from conventional aircraft design, NASA is initiating this low-cost exploratory program to study the fundamental aspects of piloting an oblique wing aircraft.

At lower flight speeds, the wing is oriented perpendicular to the fuselage, providing efficient, quiet operation for take-off and landing as well as for low speed cruise flight. The concept offers good low-speed stability and control characteristics and does not require complex high-lift systems. The engine thrust required for takeoff is substantially reduced which could result in quieter operations during takeoff and

-more-

landing.

For high-speed flights, the wing is pivoted fore and aft to form oblique angles up to 60° with the aircraft's fuselage. Studies indicate that this "scissor-wing" concept would permit better high-speed flight performance.

As the aircraft flies faster, pivoting the wing to an oblique angle decreases air drag, permitting increased speed and longer range for the same fuel expenditure.

Analytical and wind tunnel studies conducted by NASA's Ames Research Center, Mountain View, CA, indicate that a future oblique wing transport aircraft flying at 1,000 miles per hour might achieve twice the fuel economy of either the current British-French Concorde or the Russian SST. These studies also indicated that the new concept would help alleviate the sonic boom problem.

Under the terms of the contract, NASA will provide the contractor with a design and Ames Industrial will construct the aircraft of foam and fiberglass. Called the AD-1 (NASA Ames-Dryden-1), the aircraft will be approximately 40-feet long with a wingspan of 32 feet. Powered by two small 400-pound thrust turbojet engines, the AD-1 will have a gross weight of approximately 1800 pounds.

Delivery of the aircraft to NASA Dryden is expected in late 1978 and the first flights are planned for early 1979.

1/20/78 -dfrc-

NASA News

National Aeronautics and
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Ralph B. Jackson
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MEMO TO EDITORS:

The HiMAT (Highly Maneuverable Aircraft Technology) research vehicle will be rolled out and turned over to NASA on Tuesday, March 7 at the Los Angeles Division of Rockwell International, builder of the unmanned aircraft.

A press conference with key program officials participating will be held at 10 a.m. Ceremonies will begin at 11 a.m. and will feature U.S. Representative Robert K. Dornan (R-27th District); Dr. Alan M. Lovelace, Deputy Administrator of the National Aeronautics and Space Administration; and Donald R. Beall, Executive Vice President, Rockwell International.

For further information, contact Dave Wright (RI) at (213) 670-9151, ext. 1214, or Ralph Jackson (NASA) at (805) 258-8381.

-dfrc-

NASA News

National Aeronautics and
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RELEASE NO: 10-78 RELEASE DATE: IMMEDIATE

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BOOSTER RECOVERY SYSTEM TEST SCHEDULING

The first full design limit testing of the Parachute Recovery System for the Space Shuttle's Solid Rocket Boosters has been scheduled by NASA for this week.

The test has been tentatively scheduled for April 27th by NASA's Dryden Flight Research Center and will be conducted over the National Parachute Test Range, El Centro, California.

A 48,000 lb dummy booster will be dropped from a B-52 aircraft flying at an altitude of 21,000 feet. Following drop, all three main parachutes plus the pilot and drogue parachutes will be deployed to slow the rate of descent of the booster.

Primary objective of the test is to deploy the main cluster of parachutes at a high dynamic pressure to simulate the loads which will be encountered in actual use.

The Solid Rocket Boosters will be used to help launch the Space Shuttle into orbit. Following burnout at approximately 27 miles, the boosters will use the parachute recovery system for a gentle descent into the ocean for retrieval and reuse.

NASA's Marshall Space Flight Center is responsible for the development of the Solid Rocket Boosters. Martin Marietta Corporation is under contract to Marshall for the development of the recovery system. NASA Dryden is responsible for B-52 operations.

4/24/78 -dfrc-

NASA News

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in Washington

Trudy T. Phillips
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GILLAM NAMED DIRECTOR OF NASA DRYDEN FLIGHT RESEARCH CENTER

Issac T. Gillam IV has been named as Director of the National Aeronautics and Space Administration's Hugh L. Dryden Flight Research Center at Edwards, California. The announcement was made today at the Dryden Flight Research Center by NASA Administrator Dr. Robert A. Frosch.

Gillam is the former Deputy Director of the Center and has served as Acting Director since November 1977. Prior to that, he was Director of Shuttle Operations at NASA Dryden.

The Dryden Flight Research Center is NASA's major field Center for the flight-testing of high speed aircraft and other experimental vehicles. The Approach and Landing Tests of the Space Shuttle Orbiter were carried out here, and the recovery of the spacecraft from the initial orbital flights will be made here next year.

Gillam first joined NASA in 1963 as a Resources Management Specialist. In 1966 he was appointed Assistant Program Manager for the Delta Launch Vehicle and in 1968 he became Delta Program Manager. In 1973 he was appointed Program Manager, Small Launch Vehicles and International Projects which included the Delta and Scout launch vehicles and numerous international cooperative and reimbursable projects with the European Space Agency, Italy, France, Japan, Germany, etc.

-more-

Born on February 23, 1932 in Little Rock, Arkansas, Gillam graduated from Howard University, Washington, D.C. in 1953. Following graduation, he joined the U.S. Air Force and served as a pilot during the Korean Conflict. Gillam was also a missile launch commander for the Strategic Air Command and later an Assistant Professor of Air Science in the Air Force ROTC program at Tennessee State University where he pursued graduate studies.

Gillam is an Associate Fellow of the American Institute of Aeronautics and Astronautics, a Senior Member of the American Astronautical Society, a member of the Air Force Association, the National Defense Preparedness Association and the American Management Association.

Among numerous other awards, he has received NASA's highest award, the Distinguished Service Medal, for his work on the NASA Launch Vehicle Program.

Gillam is married to the former Norma Hughes of Dallas, Texas. They reside with their four children in Lancaster, California.

-dfrc-

6/13/78

NASA Facts

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ALSO BEING RELEASED IN
WASHINGTON, D.C.
MOUNTAIN VIEW, CA

Ralph B. Jackson
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NEW DEPUTY DIRECTOR NAMED AT NASA DRYDEN FLIGHT RESEARCH CENTER

John W. Boyd has been named Deputy Director of NASA's Dryden Flight Research Center, Edwards, California. The designation, which is effective January 1, 1979, was made today by NASA Deputy Administrator, Dr. Alan M. Lovelace.

The NASA Dryden Flight Research Center is NASA's major field installation for the flight testing of high speed aircraft and other experimental vehicles. The approach and landing tests of the Space Shuttle were carried out here last year and the recovery of the spacecraft from its initial orbital flights will be made here next year.

He replaces Isaac T. Gillam, former Deputy Director, who was named Director of NASA Dryden in June of this year.

Boyd is presently Deputy Director of Aeronautics and Flight Systems at NASA's Ames Research Center. He first joined Ames in 1947 and served in a variety of positions until being appointed to his present position in 1970.

Born in Danville, Virginia, on August 19, 1925, Boyd received his B.S. degree in Aeronautical Engineering from Virginia Polytechnical Institute in 1947. He is a 1966 graduate of Stanford School of Business under a Stanford Sloan Fellowship.

The author of many technical reports, Boyd has received several honors for his work, including the NASA Exceptional Service Award. He and his wife and five children presently live in Saratoga, California.

-dfrc-

October 20, 1978

NASA News

National Aeronautics and
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RELEASE NO. 22-78 IMMEDIATE RELEASE

Ralph B. Jackson
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NASA RETURNS ONE OF YF-12 AIRCRAFT TO USAF

One of two 2000 m.p.h. YF-12 aircraft being flown by NASA in a research program in the design of future high speed aircraft was returned to the Air Force today.

The remaining aircraft will be flown by NASA's Dryden Flight Research Center, Edwards, California, for approximately six more flights and then it will also be retired, probably sometime early next year.

NASA began flying the YF-12 in 1970 to obtain inflight information at sustained cruise speeds of Mach 3, approximately 2000 m.p.h., and at altitudes of 70,000 feet. Data from the program will be used to increase the understanding of phenomena associated with flight at these conditions.

Since assuming operational control of the two YF-12's, NASA has flown 224 flights in the two aircraft. Two national technical symposiums have been held at NASA Dryden to disseminate results of the program to the aircraft industry and other government agencies.

Oct. 27, 1978 D-F-R-C

NASA Facts

National Aeronautics and
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FOR RELEASE: Tuesday
December 5, 1978
ALSO BEING RELEASED IN
CLEVELAND, OH

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Paul Bohn
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Ext. 415

FLIGHT TESTS OF ADVANCED PROPELLERS BEING PLANNED

Flight tests of several advanced propeller models will be conducted by NASA's Lewis Research Center, Cleveland, OH, and NASA's Dryden Flight Research Center, Edwards, CA.

The propellers to be tested are eight and ten bladed and are intended for new, high-speed, fuel conservative aircraft of the future.

The Lewis Center has already measured the aerodynamic performance of the approximately one-seventh (two-foot diameter) propeller models in its wind tunnel at a simulated cruise speed of 855 kilometers per hour (530 mph) and an altitude of 10,668 meters (35,000 ft.).

NASA estimates that at these cruise conditions an advanced turboprop engine with the new-design propeller would offer 20 to 40% fuel savings over current turbofan engines and a 10 to 20% fuel savings over advanced turbofan engines.

-more-

NASA News

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RELEASE NO: 23-79 FOR RELEASE: Immediate

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Dryden Flight Research Center, Edwards, CA
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HiMAT RESEARCH PLANE TO MAKE FIRST FLIGHT

The first flight of a new NASA-U.S. Air Force research vehicle that will investigate advanced technology that could lead to future military aircraft with twice the maneuverability of present day fighters is scheduled for July 10, at NASA's Dryden Flight Research Center, Edwards, CA.

Called HiMAT, for Highly Maneuverable Aircraft Technology, the small research craft is expected to be able to sustain twice the turn rate of current fighters at transonic and supersonic speeds.

Because the concept includes so many high-risk technical advances, it was decided not to man-rate the research plane but to fly it using the remotely piloted research vehicle technique developed by NASA several years ago. This technique, which permits piloting the vehicle from the ground, is a more economical and safer method of flight testing high-risk technology.

-more-

Incorporated in the plane are several new advances. Flight testing these advances in one vehicle at the same time permits the study of their combined interaction and making the interactions as favorable as possible.

The research vehicle was designed from the start to be built with approximately 30 percent composite material. In addition to the weight savings, the composite material allows for "aeroelastically tailoring" the wings and canards (the smaller forward set of wings) for increased maneuverability and performance. Both sets of airfoils are aeroelastically tailored to twist and bend in flight to the most favorable shape to achieve maximum performance for the particular flight conditions. The vehicle uses the increased lift from the combination of the canards and wings to increase maneuverability at both subsonic and supersonic speeds.

The plane uses a digital fly-by-wire (electronic) control system instead of a conventional control system. Pilot commands are fed via telemetry to an onboard computer which then sends electronic commands to the flight control surfaces. Fly-by-wire flight control systems are lighter in weight and more versatile in terms of automatic features than conventional systems.

The plane also incorporates an integrated propulsion system that uses a digital computer to provide control of the aircraft's entire propulsion system, instead of a conventional hydromechanical system. The system integrates control of the jet engine and nozzle and permits optimum performance without adverse interaction.

-more-

The research vehicle also incorporates active control technology whereby the flight control system provides basic aircraft stability. Use of this technology saves weight and increases performance since the size of the normal stabilizing surfaces can be reduced.

Winglets, small vertical extensions of the wing tips, provide additional stability and performance.

In addition to studying the various new technologies and their interaction, flight test data will be fed into the Differential Maneuvering Simulator at NASA's Langley Research Center, Hampton, VA, for an assessment of a full-scale fighter's capabilities based upon flight-verified aerodynamic characteristics. Use of these results in the simulator would permit a military assessment of this particular aircraft's capabilities against specific adversaries.

The research plane, with a wing span of just over 4 1/2 meters (15 feet) and a length of 7 meters (22 1/2 feet), is a 44 percent scale model of a 7,711-kilogram (17,000 pound) fighter. It weighs 1,542 kilograms (3,400 pounds) at launch. Powered by a General Electric J-85 jet engine, HiMAT should be capable of speeds in excess of Mach 1.5 (one and one-half times the speed of sound) or about 1,600 kilometers per hour (1,000 miles per hour).

The plane will be air launched, with its jet engine running, from a B-52 flying at 14,000 meters (45,000 feet). The pilot in the ground cockpit will then take full control and fly the entire mission including landing on the dry lake bed at NASA Dryden. If required, back-up flight control is available through a two-seat F-104 chase aircraft.

-more-

Two vehicles were built by the North American Aircraft Division of Rockwell International for approximately $17 million. The concept is a joint NASA-U.S. Air Force program sponsored by NASA's Office of Aeronautics and Space Technology. The Dryden Center has overall program responsibility with assistance provided by the Air Force's Flight Dynamics Laboratory, Wright-Patterson Air Force Base in Ohio.

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Photographs and drawings to illustrate this news release will be distributed without charge only to media representatives in the United States. They may be obtained by writing or phoning:

Public Affairs Audio-Visual Office Code LFD-10/NASA Headquarters Washington, D.C. 20546 Telephone No: (202) 755-8366	Photo Nos: 79-H-342 79-H-343 79-H-344 78-H-519 75-H-1029

or

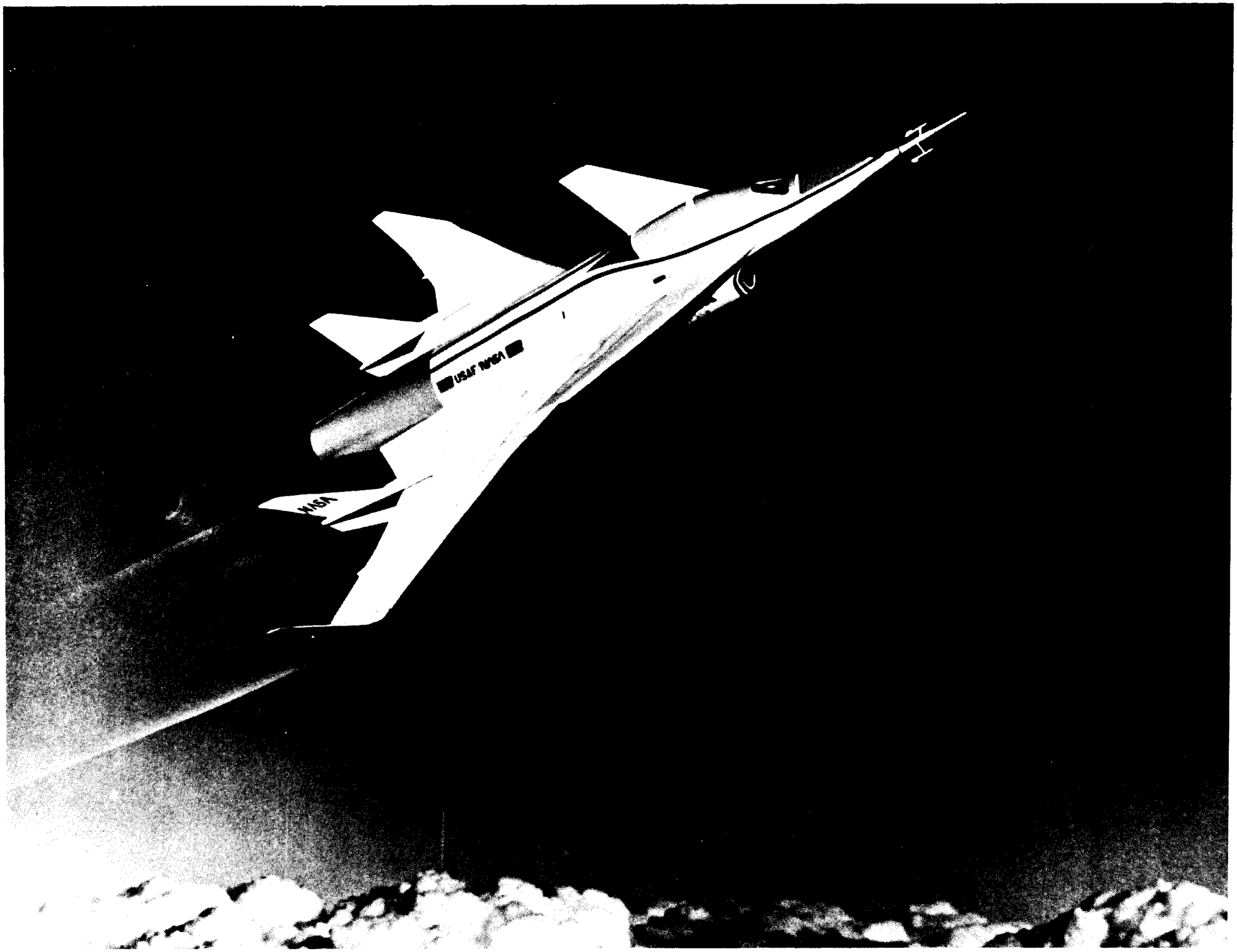
External Affairs Office Dryden Flight Research Center Edwards, CA 93523 Telephone No: (805) 258-8381	Photo Nos: E 33909 E 34663 E 34665 E 36059 E 36060 E 36061 ECN 10924

-End-

NOTE: End of general news release. Background material follows.

NASA National Aeronautics and Space Administration

Hugh L. Dryden Flight Research Center
Edwards, California



E 33909

NASA National Aeronautics and Space Administration

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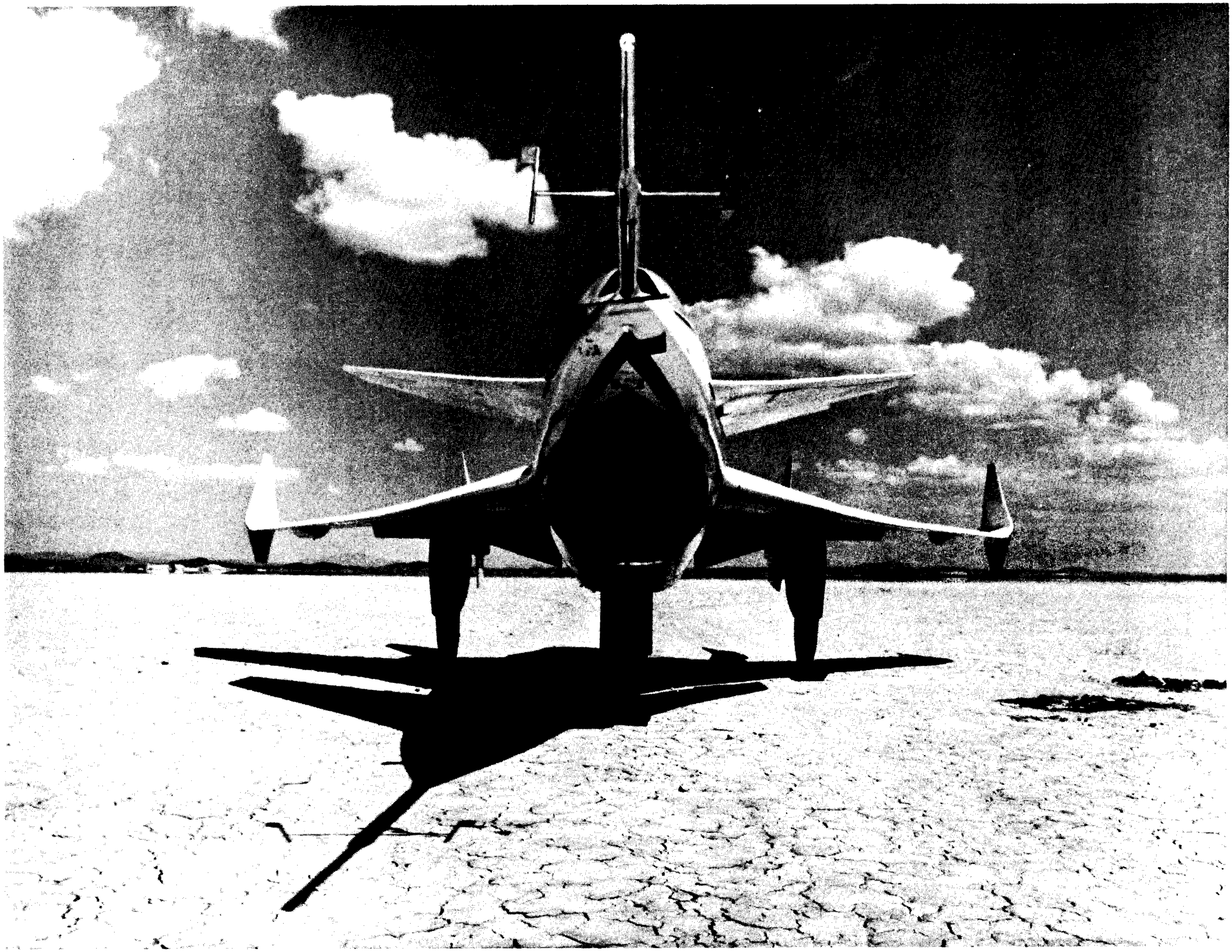

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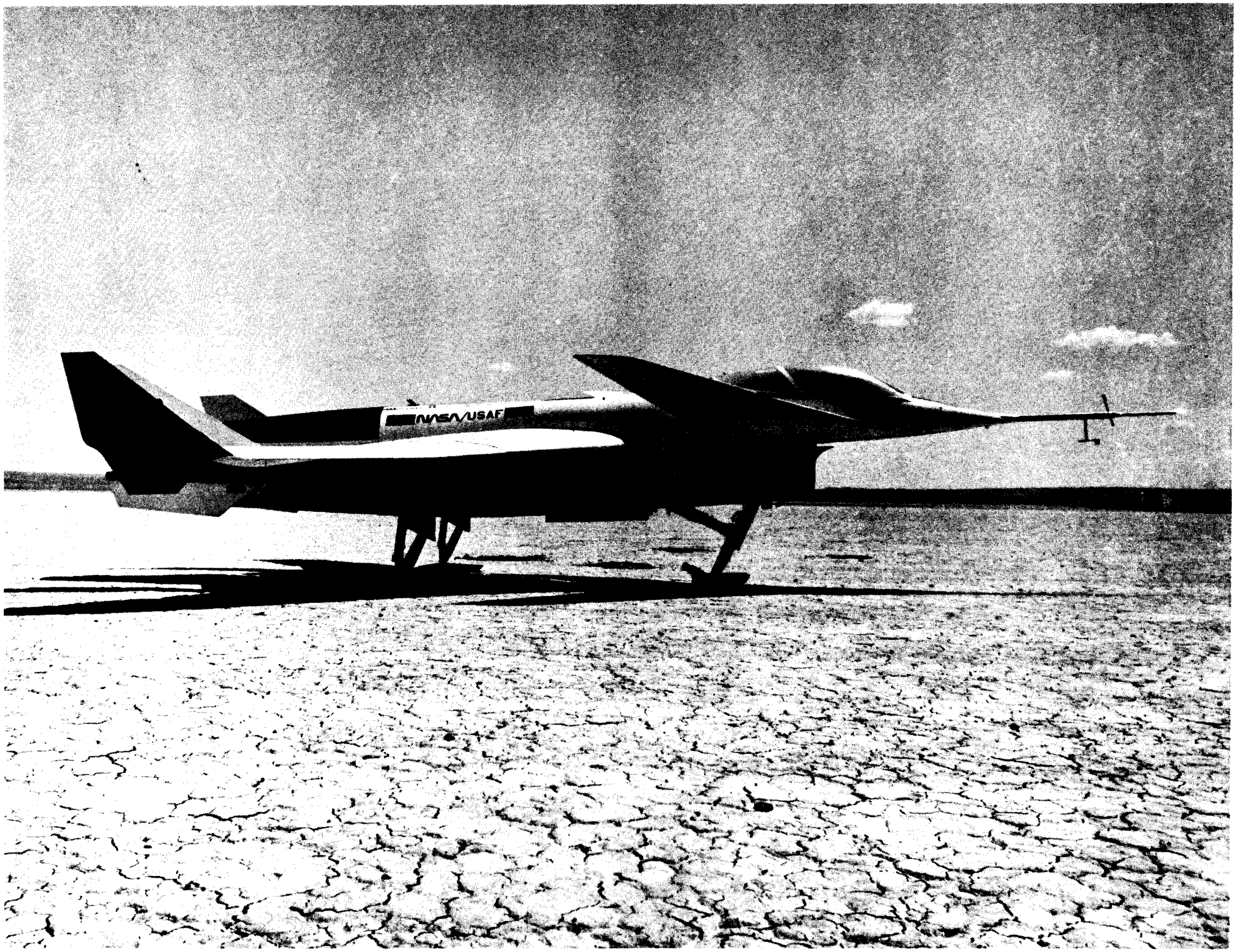

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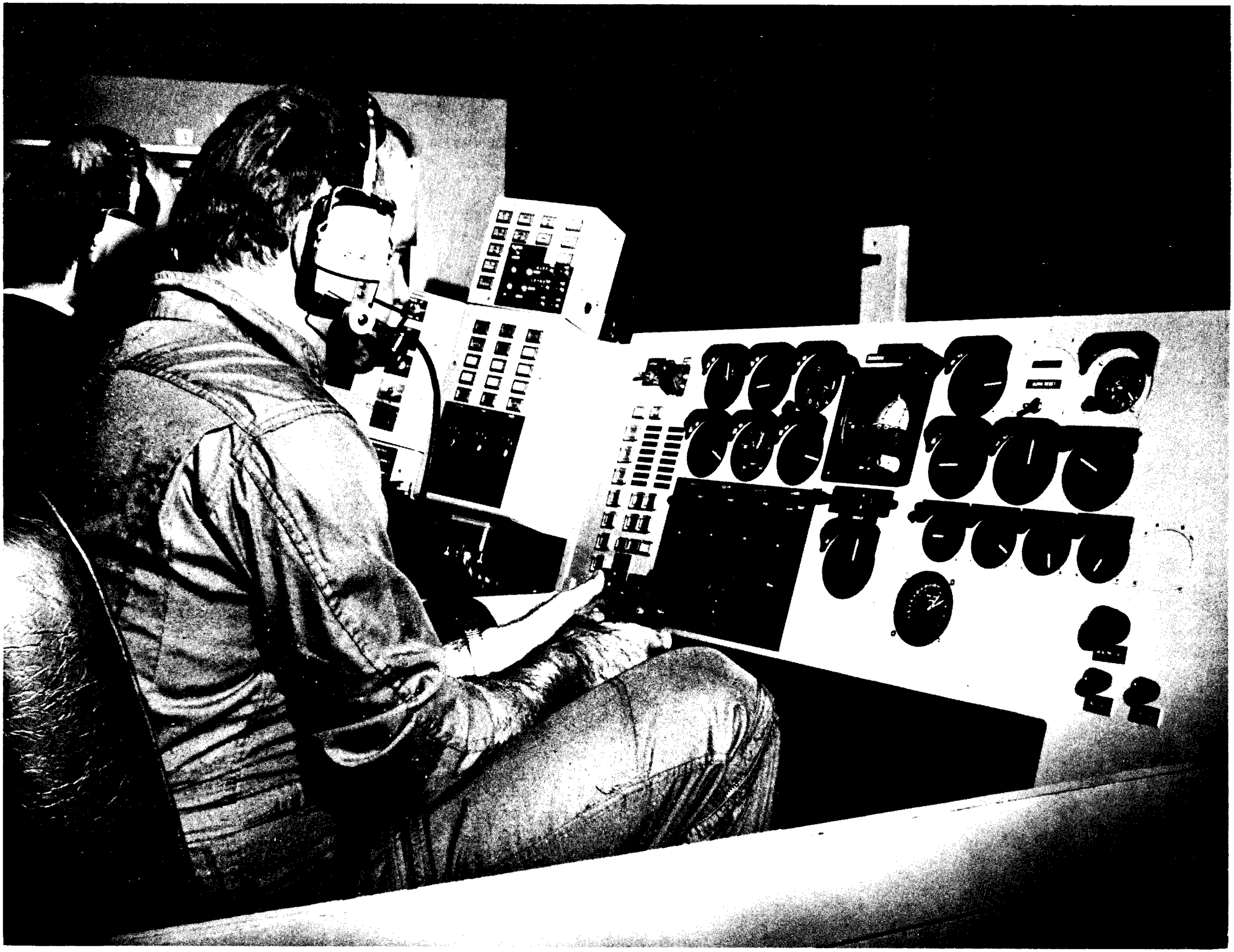


E 36059

MANEUVERABILITY ENHANCEMENT

TURN CAPABILITY

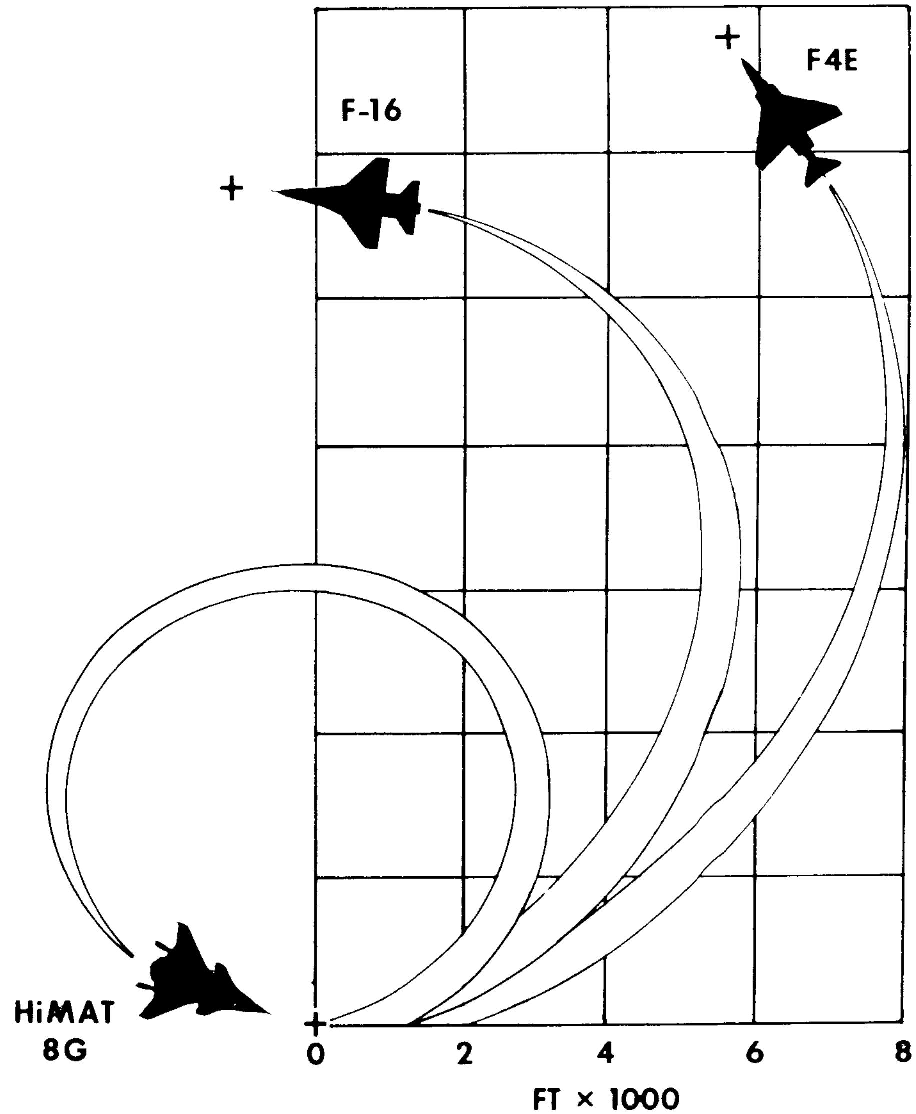
- SUSTAINED LOAD FACTOR
- 30,000 FT ALTITUDE
- M = 0.9

DL/DSF CAPABILITY

- DL 1G
- DSF .3G

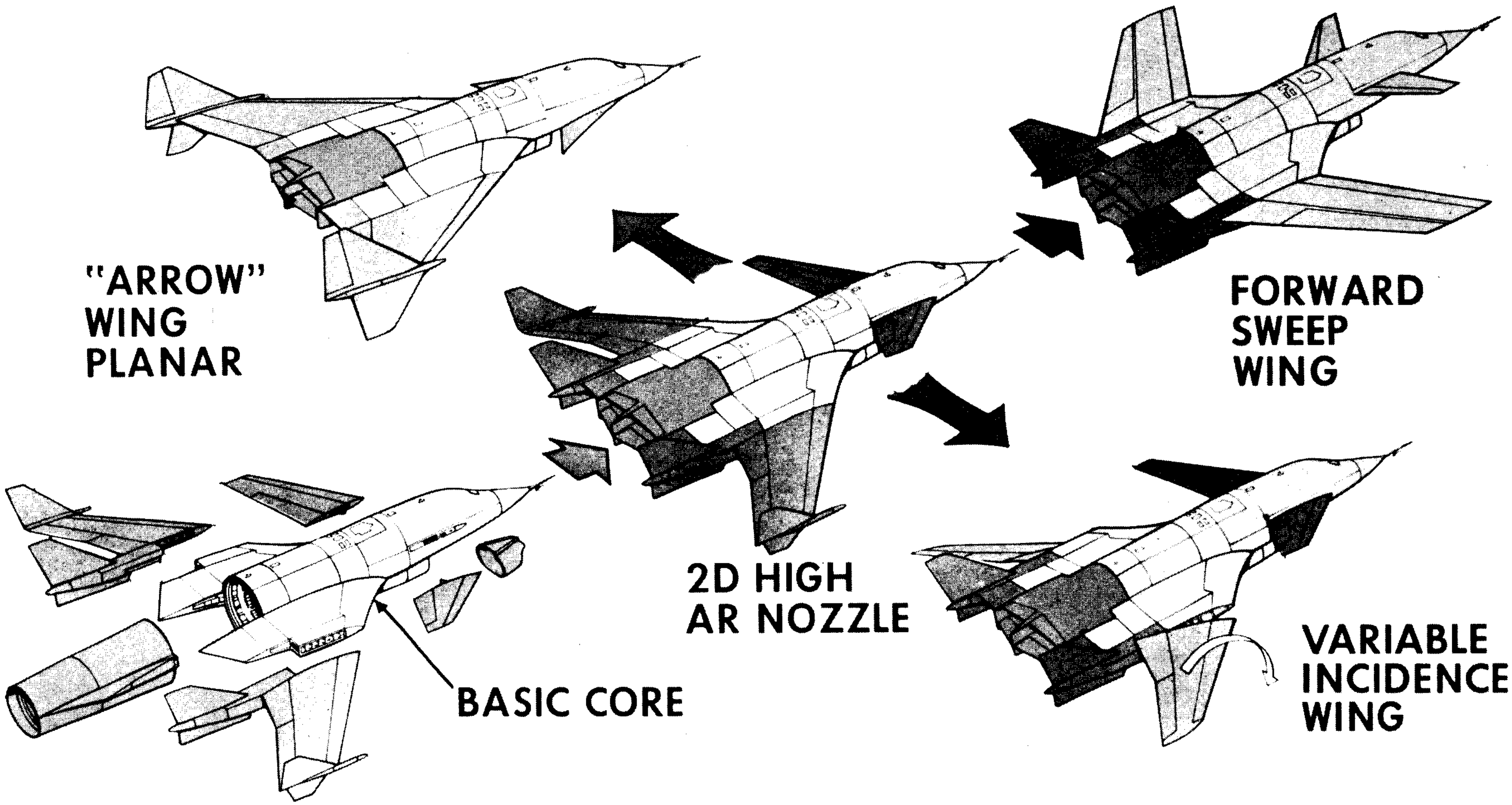
SUPERSONIC CAPABILITY

- M = 1.2 ~ 6G, 30K FT ALTITUDE
- M = 1.4 ~ 4G, 30K FT ALTITUDE

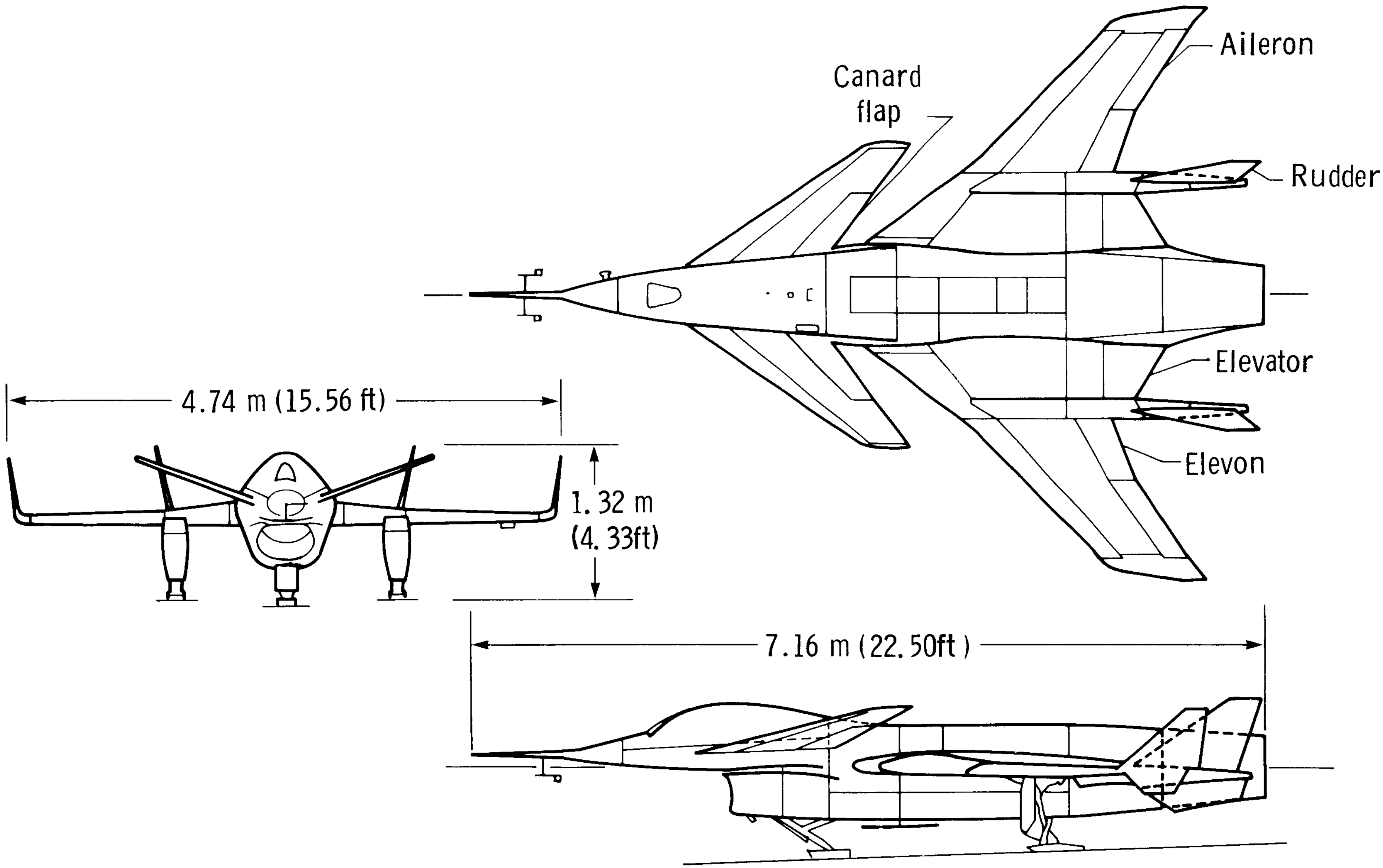


FUTURE DEMO POTENTIAL

MODULAR DESIGN



- SIMPLE LIGHTWEIGHT STRUCTURE - EASILY MODIFIED
- NON-MANRATED HARDWARE SAVES COST AND TIME
- LOW OPERATING COST


Canard flap
Aileron
Rudder
Elevator
Elevon
4.74 m (15.56 ft)
1.32 m (4.33ft)
7.16 m (22.50ft)

ECN 10924

REMOTELY PILOTED RESEARCH VEHICLE

(RPRV)

A new method of flight test technique that could provide an economical and far less hazardous means of testing advanced aircraft and spacecraft has been developed at NASA's Dryden Flight Research Center.

The new technique is not intended to replace manned flight testing but would be used where there is a high degree of risk that the test aircraft would be severly damaged with possible physical injury, or where costs would preclude a manned full-scale flight test vehicle.

The new method involves the air launch of large scale models, up to nine meters (30 feet) long, called Remotely Piloted Research Vehicles (RPRV) from carrier aircraft. A test pilot in a ground cockpit complete with flight controls and flight instruments flys the RPRV through the desired test maneuvers using telemetry and television.

Initially, a parachute system was used for recovery. Technique development now permits landings of the RPRV under the control of the ground test pilot.

As opposed to other remotely piloted vehicles that use an auto-pilot type of control system, the test pilot of the RPRV remains in continuous direct control of the test model at all times using conventional flight controls and a complete set of flight instruments. This allows the pilot to perform all of the precision flight maneuvers such as wind-up turns, control pulses and other unusual control maneuvers required for flight test operations.

To develop the new technique, engineers and pilots at NASA's Dryden Flight Research Center flew a twin-engine aircraft with a preliminary version of the control system. Telemetry was used to send control commands to the aircraft and flight information back to the pilot displays in the ground cockpit. The ground pilot used television and radar to navigate the plane from place to place and was able to safely land the aircraft from the ground cockpit.

The next phase of the RPRV test technique development program was the introduction of a computer into the ground control system to provide the capabilities to match the sophisticated control systems of modern day aircraft. Control inputs from the ground cockpit are fed through the computer which is pre-programmed with the flight characteristics and simulated control system of the test aircraft. The use of the computer permits the use of an uncomplicated and low cost type of control system in the RPRV and still represents a complex control system in the proposed full scale aircraft.

-30-

AIR FORCE FLIGHT DYNAMICS LABORATORY
CONTRIBUTIONS TO
HIGHLY MANEUVERABLE AIRCRAFT TECHNOLOGY (HiMAT)

Since the early 1970's, engineers at Air Force Flight Dynamics Laboratory at Wright-Patterson AFB, Ohio, have been consultants to the National Aeronautics and Space Administration for HiMAT and provided funds and personnel in support of the program.

Two technologies on HiMAT are descendents of related research efforts within Flight Dynamics Laboratory: aeroelastic tailoring of composite materials and canards or mini-wings located forward of HiMAT's main wings.

It is those technologies, to a great extent, that give HiMAT its great amount of maneuverability: sustained eight "G" turns at Mach 0.9 at 25,000 feet, and more than three minutes of supersonic flight. If aeroelastic tailoring and the canards prove successful during HiMAT flight testing, they could be incorporated into future designs of Air Force vehicles.

Aeroelastic tailoring is a structural design concept that originated in the laboratory in the early 1970's. It uses the unique directional properties of graphite composite materials to control bending and twisting under aerodynamic loading. The composite part is manufactured, in effect, by laying up or orienting composite fibers in the direction that results in favorable wing twisting as aerodynamic loading is increased.

HiMAT's composite wing can be compared roughly with a wood veneer that is stiff in one direction, but very pliable in another. Under "G" stresses, the composite structure will deform enough to give the vehicle about 10 percent additional maneuvering capability--even in very tight turns.

About 25 percent of HiMAT's total weight is graphite epoxy composite material. Most of HiMAT's graphite composites are designed into the wing and canard areas that are critical surfaces when the vehicle begins pulling high Gs.

Historically, Flight Dynamics Laboratory began work on canards in the early 1970's as devices for increasing maneuverability on high performance aircraft. Canards were used on the XB-70 bomber and two control configured vehicles, or CCVs, modified by the laboratory: a B-52 bomber and YF-16 fighter.

More recently, the laboratory's Advanced Fighter Technology Integration or AFTI program will use canards as one of several new technologies to be evaluated on modified F-16 test-bed for potential use in future tactical fighters.

HiMAT uses the lift of the wing and canard combination to enhance maneuverability and controllability throughout the subsonic/supersonic flight envelope. During extensive wind tunnel testing of HiMAT models, for example, it was proven that the canards can reduce drag significantly during high-angle-of-attack maneuvers.

-dfrc-

NASA News

National Aeronautics and
Space Administration

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AC 805 258-3311

RELEASE NO: 27-79 FOR RELEASE: Immediate

Ralph B. Jackson
(805) 258-8381

ALSO BEING RELEASED BY
NASA HEADQUARTERS

Winglet Flight Testing To Begin

~~NASA's Dryden Flight Re~~search Center has scheduled the first flight of a modified USAF jet cargo/tanker aircraft that could provide significant fuel savings. First flight in the joint USAF-NASA program is tentatively slated for July 20, 1979.

Winglets, nine-foot long airfoil sections, have been attached to the wingtips of a KC-135. They are expected to improve the overall performance of the aircraft in cruise flight by approximately eight per cent.

According to studies conducted by the Air Force Flight Dynamics Laboratory, Wright Patterson AFB, OH, KC-135s retrofitted with winglets could provide performance improvements resulting in annual savings of 68,000 gallons of fuel per KC-135 aircraft or 45 million gallons for the entire fleet of aircraft (based upon 1975 utilization rates).

The winglet concept was developed in the wind tunnels of NASA's Langley Research Center by Dr. Richard T. Whitcomb, who also conceived the supercritical wing, another fuel saving design.

The winglets are two feet wide at the tip and six feet wide at the base and weigh about 215 pounds each. They are designed to convert a portion of the normal drag that is produced by the wingtip vortices into a forward force

-more-

which increases the overall performance of the aircraft.

It is possible to vary the incidence and cant angle of the winglets in-between flights to determine their effectiveness at varying positions.

Prior to installation of the winglets, a series of baseline flights were flown by NASA Dryden. Data from the flights without winglets and with winglets installed will be compared to measure the winglet effectiveness.

-dfrc-

July 16, 1979

NASA
National Aeronautics and
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NASA News

National Aeronautics and
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July 31

RELEASE NO: 28-79

FOR RELEASE: Immediate

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ALSO BEING RELEASED BY
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NASA TO FLY F-14 AIRCRAFT

An F-14 fighter aircraft has been loaned by the Naval Air Systems Command to NASA's Dryden Flight Research Center where it will be flown in a joint NASA-USN research program.

The aircraft will be flown as part of NASA's in-flight research on current high-speed military aircraft. NASA Dryden is currently operating two USAF F-15 fighters and Dryden pilots have flown the YF-17, the prototype of the new F/A-18 Navy multimission aircraft.

The F-14 program will include an in-flight assessment of a new control system concept developed by NASA.

Preliminary planning is currently underway to determine the potential to expand the program to include propulsion research, an investigation of the effects of external stores, and other areas of common Navy-NASA interest.

Data from the program will be used to aid in the design of future high-speed aircraft.

-dfrc-

July 31, 1979

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
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AC 805 258-3311

RELEASE NO: 29-79 FOR RELEASE: IMMEDIATE

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SHUTTLE RETURNS TO NASA DRYDEN

The Space Shuttle Enterprise is scheduled to return to NASA's Dryden Flight Research Center on August 16, following a six-day trip from NASA-s Kennedy Space Center, FL.

Enterprise, OV-101, was the Shuttle flown here during its approach and landing tests in 1977. It will not be flown in space but various parts of it may be used in the construction of other Shuttles that will fly in space.

During its landing tests, the Enterprise made five unmanned captive tests, three manned captive tests, and five free flights in which the Shuttle separated from its 747 carrier aircraft and glided to a landing here.

Following these flight tests, OV-101 was ferried to NASA's Marshall Space Flight Center, AL, where it underwent ground vibration tests. It was then sent to NASA's Kennedy Space Center in April 1979 to help check-out the assembly, test, and launch facilities for OV-102, Columbia, the first Shuttle to fly in space.

-more-

The Enterprise may eventually be transported via truck to the Rockwell facility in Palmdale where parts of it may be removed for additional ground testing and possibly in the construction of future Orbiters.

-dfrc-

August 7, 1979

NOTE TO EDITORS: Media wishing to cover this event should contact Ralph B. Jackson, (805) 258-8381

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RELEASE NO: 79-38

FOR RELEASE: Immediate

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ALSO BEING RELEASED AT
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NASA Wake Vortex Tests

NASA is conducting flight research tests aimed at reducing the hazards of trailing wake vortices of large aircraft.

Wake vortices are normally invisible flows of turbulent air that stream in a funnel-shaped flow from the wing tips and flaps of aircraft in flight. Because vortices generated by large aircraft can be a hazard to smaller aircraft, the FAA requires a three to six mile spacing between these aircraft approaching terminals for landings. The spacing allows time for break-up of the trailing vortices, but it also slows flight operations and contributes to passenger delays caused by airport congestion.

NASA, through wind tunnel and other experimental techniques, is investigating concepts to reduce the strength of the wake vortices, which would allow closer aircraft spacing to take place and reduce delays.

One promising concept is the partial deployment of some selected wing spoilers, normally used for decreasing aerodynamic lift after landing.

-more-

The current tests are being conducted by NASA's Dryden Flight Research Center, in conjunction with Federal Aviation Administration, utilizing a Boeing 747 aircraft to generate the vortices which are being probed by smaller, instrumented aircraft. The flight tests will attempt to verify optimum deployment of spoiler arrangements, as suggested by wind tunnel tests. The flight tests will be conducted both at altitude in a simulated approach condition and in actual approaches and landings.

-dfrc-

October 26, 1979

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National Aeronautics and
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RELEASE NO: 39-79

FOR RELEASE: Immediate

Ralph B. Jackson
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ALSO BEING RELEASED AT
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First Flight of AD-1 Oblique Wing Aircraft Scheduled

First flight of the AD-1 Oblique Wing Research Aircraft is planned for December 19, at the NASA Dryden Flight Research Center, Edwards, California. The research aircraft employs a pivoting-wing concept which studies indicate could reduce noise and lower fuel consumption of future high-speed, transport-type aircraft.

Analytical and wind tunnel studies conducted by NASA's Ames Research Center, Mountain View, CA, indicate that future oblique wing transport aircraft flying at 1,000 miles per hour might achieve twice the fuel economy of more conventional swept-wing transport aircraft.

At lower flight speeds, the wing would be oriented perpendicular to the fuselage, providing efficient, quiet operation for take-off and landing as well as for low-speed cruise flight. The concept offers good low-speed stability and control characteristics and does not require complex high-lift systems. The engine thrust required for take-off would be substantially reduced and could result in quieter operations in the terminal area.

-more-

For high-speed flights, the wing would be pivoted fore and aft to form oblique angles up to 60 degrees with the aircraft's fuselage. Studies indicate that this "scissor-wing" concept would permit better high-speed flight performance.

As the aircraft flys faster, pivoting the wing to an oblique angle would decrease air drag, permitting increased speed and longer range for the same fuel expenditure.

Because the concept is a significant departure from conventional aircraft design, NASA has initiated a low-cost exploratory program to study the fundamental low-speed operations of such an aircraft using a small, lightweight, manned test aircraft.

Called the AD-1 (NASA Ames-Dryden-1), the research aircraft is approximately 40-feet long, with a wingspan of 32 feet. Powered by two small 220-pound thrust turbojet engines, the AD-1 has a gross weight of approximately 2000 pounds and will be capable of speeds in the 150-220 m.p.h. range.

For the first flight, the wing will remain in a position perpendicular to the aircraft fuselage. On later flights, the wing can be pivoted from 0 to 60 degrees while in flight.

The aircraft was constructed by the Ames Industrial Company, Bohemia, NY, under a $240,000 fixed-price contract with NASA's Dryden Flight Research Center, Edwards, CA.

-dfrc-

December 12, 1979

NASA News

National Aeronautics and
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Duny

RELEASE NO: 79-40 FOR RELEASE: Immediate

Ralph B. Jackson
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JOHANNES NAMED AS DEPUTY DIRECTOR

Robert P. Johannes has been named Deputy Director of the National Aeronautics and Space Administration's Hugh L. Dryden Flight Research Center. He will replace John W. Boyd, who will become Associate Director at NASA's Ames Research Center. The appointment is effective December 1, 1979.

The former Director of Engineering at NASA Dryden, Johannes served in various technical capabilities at the Air Force Flight Dynamics Laboratory prior to joining NASA in July 1979. Born on March 12, 1934, he received his B.S. in Electrical Engineering from the University of Illinois and his Masters Degree from the Air Force Institute of Technology.

An Associate Fellow in the American Institute of Aeronautics and Astronautics, Johannes has received the Wright Brothers Medal from the Society of Automotive Engineers and a Scientific Achievement Award from the Air Force for his work in developing the control configured vehicle concept of aircraft design.

Boyd will return to NASA Ames on January 1, 1980, where he previously served as Deputy Director of Aeronautics and Flight

-more-

Systems before transferring to NASA Dryden. He first joined NASA in 1947, following graduation from Virginia Polytechnic Institute with a degree in Aeronautical Engineering. He is also a 1966 graduate of Stanford School of Business under a Stanford Sloan Fellowship.

-dfrc-

November 20, 1979

NASA News

National Aeronautics and
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[see July 18 and Oct 29, 1979]

RELEASE NO: 80-7

FOR RELEASE: Immediate

Ralph B. Jackson
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ALSO BEING RELEASED BY
NASA HEADQUARTERS,
WASHINGTON, D.C.

WAKE VORTEX TESTING RESUMES

NASA's Dryden Flight Research Center, Edwards, CA, in conjunction with the Federal Aviation Administration, has resumed wake vortex flight testing with an L-1011 wide-body jet transport aircraft.

The tests are aimed at reducing the vortices that are generated by aircraft and are severe enough from the wide-body class of aircraft to require time delays in take-offs and landings at airports. Because the vortices are capable of upsetting other aircraft landing or taking off, planned time separations are currently imposed.

If the vortices can be diminished, traffic congestion can be reduced which could result in significant fuel and time savings.

Previous tests with a Boeing 747 transport indicate that it may be possible to break up the vortices, an invisible flow of turbulent air that streams from the flaps and wingtips in a tornado shaped pattern, by selected use of the aircraft's ailerons and spoilers.

The spoilers, which are normally used as speed brakes and to decrease the aerodynamic lift after landing, will be used in flight to disturb the vortices trailing from the wing flaps. The ailerons, which

-more-

are normally used for turning, will be deployed to disturb the wing tip vortices.

The L-1011 to be used in the tests is the Lockheed prototype certified with a direct lift flight control system that has the spoilers normally deflected at an upward angle of eight degrees.

Thus the proposed vortex alleviation system is not greatly different from the present approved flight control system already in use on the long range L-1011 aircraft.

The flight tests will consist of high altitude probing of the vortices (marked by smoke generators) by a small, highly instrumented NASA test aircraft.

If the high altitude tests are faborable, simulated landing approaches will be made to a runway on the dry lakebed here. A laser doppler velocimeter, a monostatic acoustic radar sensing system, and a ground wing vortex sensing system will be used to measure the trailing vortices in ground effect.

If the configuration changes to the L-1011 alleviate the vortices sufficiently, actual landings of the test aircraft at reduced separation distances are under consideration.

-dfrc-

June 10, 1980

NASA News

National Aeronautics and
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Hugh L. Dryden Flight Research Center
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AC 805 258-3311

RELEASE NO: 80-8 FOR RELEASE: Immediate

Ralph Jackson
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HiMAT FOURTH FLIGHT SCHEDULED

The prototype of future aircraft with twice the maneuverability of present-day fighter type aircraft is scheduled to return to flight status after more than four months of modifications.

The HiMAT (Highly Maneuverable Aircraft Technology) research craft is scheduled for its fourth launch flight in mid-June at NASA's Dryden Flight Research Center, California. The modification period was planned during the rainy season as the aircraft was not able to land on Roger's Dry Lakebed due to flooding.

The fourth flight is expected to reach Mach .925 with the major objective being flutter envelope clearance and to gain additional stability and control data.

According to Paul Loschke, HiMAT Project Manager, the modification period will enable clearance of the transonic flight envelope in preparation for flights in an unstable configuration. Modifications made to Air Vehicle #1, which has accumulated slightly over one and one-half hours of free flight time to date, were airframe, instrumentation system, flight control system, and the command and control data link.

-more-

The eight-flight Phase I program to demonstrate the maneuverability of the 44 percent scale model of a 1990 conceptual fighter has obtained data at eleven of the planned twenty flight conditions plus one additional flight condition which yielded data to be used to verify backup flight control system operation. The 3400-pound vehicle has obtained speeds up to 595 miles per hour at altitudes to 40,000 feet and a maximum load factor of 4.5 g's.

Maximum load factor to be demonstrated is expected to be 8 g's on flight eight in October 1980, while the maximum speed expected will be 925 miles per hour at 40,000 feet in the summer of 1981.

Air Vehicle #2 is presently being modified and upgraded to support Phase II flights, to begin in late 1980, to gather inflight wing/canard pressure and deflection data. The two and one-half year Phase II program will use both air vehicles and fly thirty-two data flights.

-dfrc-

June 11, 1980

NASA News

National Aeronautics and
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Hugh L. Dryden Flight Research Center
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AC 805 258-3311

June 12

RELEASE NO: 80-9 FOR RELEASE: Immediate

Ralph B. Jackson
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UNMANNED CRAFT CRASHES

An unmanned remotely piloted vehicle crashed this morning during a research flight at NASA's Dryden Flight Research Center. The small research craft called DAST for Drones for Aerodynamic and Structural Testing was air launched from a B-52 mother ship at approximately 7:10 a.m. (PDT) and encountered wing structural problems approximately 10-minutes later. It impacted near a dry lakebed North of here. NASA is determining the cause of the accident.

The DAST program is aimed at demonstrating the ability of advanced flight control systems to control wing flutter. Because there was a possibility that structural damage could occur in flight, the DAST program utilized the Remotely Piloted Research Vehicle technique that was developed here as a more economical and safer method of flight testing advanced high risk concepts. The test vehicle is air launched from a mother ship and then flown through the flight test maneuvers by a pilot located in a ground cockpit using telemetry.

-dfrc-

June 12, 1980

NASA News

National Aeronautics and
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Aug 6

RELEASE NO: 80-16

FOR RELEASE: Immediate

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ALSO BEING RELEASED AT NASA HEADQUARTERS, WASHINGTON, D.C.

NASA DRYDEN RECEIVES TILT-ROTOR EXPERIMENTAL AIRCRAFT

A new airplane that can take off and land like a helicopter and cruise in flight like a conventional aircraft will be delivered to NASA's Dryden Flight Research Center, Edwards, CA, on August 13, 1980.

Two XV-15 Tilt Rotor experimental aircraft were built for NASA and the U.S. Army by Bell Helicopter, Textron, Fort Worth, Texas. The second XV-15 aircraft is at NASA's Ames Research Center, Mountain View, CA, preparing for research flight tests.

Because the XV-15 is capable of tilting its two wingtip mounted engines and rotors from the vertical to the horizontal position, the aircraft can fly as a helicopter, a short takeoff and landing aircraft, a conventional aircraft in forward flight or any combination of the three.

Thus the aircraft can take off vertically as a helicopter and convert to the conventional aircraft mode in flight and gain the high-speed performance advantages of conventional aircraft.

-more-

The XV-15 aircraft have received their initial flight tests at the Bell facility. The aircraft being delivered to NASA Dryden will be used to expand the performance limits by NASA, military and contractor pilots. Then, the XV-15 aircraft at NASA Ames will be flown within these limits to perform specific research objectives. The flight program at Dryden is expected to last approximately one year.

First flight of the XV-15 is expected approximately three to four weeks after arrival at NASA Dryden.

-dfrc-

August 8, 1980

NASA News

National Aeronautics and
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AC 805 258-3311

MEMO TO EDITORS:

An acceptance flight and turnover ceremony of the tilt rotor XV-15 aircraft that takes off like a helicopter and cruises like a conventional aircraft will be made at 9:30 a.m., Thursday, October 30, at NASA's Dryden Flight Research Center. Media wishing to cover this event should contact Ralph Jackson, NASA Dryden Public Affairs (805) 258-8381.

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
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RELEASE NO: 80-28

FOR RELEASE: Immediate

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(415) 965-5091

Ralph B. Jackson
(805) 258-8381

ALSO BEING RELEASED AT NASA AMES, MOUNTAIN VIEW, CA.

UNIQUE RESEARCH AIRCRAFT SET FOR GOVERNMENT TESTS

NASA and U.S. Army Tilt Rotor Research Aircraft project officials from Ames Research Center will officially accept the first of two research aircraft in brief ceremonies at NASA's Dryden Flight Research Center on Thursday, October 30.

The tilt rotor research effort is a joint program of NASA and the U.S. Army Research and Technology Laboratories (AVRADCOM). The two research aircraft were built under government contract by Bell Helicopter Textron, Fort Worth, Texas. The first aircraft was delivered to Ames Research Center in March, 1978, where it underwent extensive testing in the Ames full-scale wind tunnel. The second aircraft was delivered to Dryden Flight Research Center on August 13, 1980, after completion of 57 hours of initial flight testing conducted by Bell at their Arlington, Texas, flight test facility. To date, two contractor pilots, two NASA project pilots, one Army test pilot and one Marine pilot have flown and evaluated the aircraft.

-more-

Principal accomplishments of initial flight testing include:

* Demonstration of full conversions from the helicopter mode to the aircraft mode.
* Establishment of a safe operating envelope.
* Expansion of the operating envelope to 300 knots in the airplane mode.
* Verification of aeroelastic stability over the present operating envelope.
* Demonstration and verification of emergency systems and operating procedures.
* Preliminary evaluation of handling qualities.
* Expansion of the operating envelope to include limited basic maneuvers (banks, turns, pull-ups and push-overs)

The Tilt Rotor Research aircraft have large-diameter, highly-twisted proprotors mounted at each wing tip. For vertical takeoff or hover the proprotors rotate in the horizontal plane and the aircraft flies like a helicopter. For forward flight, the proprotors are rotated forward to provide thrust for flight at higher speeds, above 550 kilometers per hour (300 knots), in the airplane mode. Benefits of this type of aircraft include efficient hover comparable to the helicopter and fuel efficient high-speed capability comparable to turbo-prop aircraft. Low noise levels in the airplane mode and high energy efficiency in all flight modes are inherent in the concept.

-dfrc-

October 27, 1980

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-1 FOR RELEASE: Immediate

Ralph B. Jackson
(805) 258-8381

NASA DRYDEN COMPLETES SHUTTLE TILE TESTS

Actual flight tests of the Space Shuttle thermal protection tiles on an F-15 and F-104 aircraft have been completed by NASA's Dryden Flight Research Center. Approximately 60 flights were flown in the 12-month flight test program.

Tile sections representing six different locations on the orbiter have been flown at 1.4 times the aerodynamic load conditions that the Shuttle will encounter during launch. The six different tile locations on the orbiter that were flight tested by NASA Dryden are the closeout tile aft of the wing leading edge area, the forward wing glove area, vertical tail leading edge, window post area, elevon trailing edge, and elevon hinge area. Maximum speeds of 1.4 times the speed of sound and dynamic pressures of 1140 pounds per square foot were achieved during the program. Following each flight the test section was inspected and precisely measured to identify any deformation or structural changes that may have occured as a result of the flight loads.

As the result of the Dryden flight test program, design changes of varying degrees have been made to the thermal protection system

-more-

on the under side of the orbiter wing leading edge, on the wing glove area, around the window posts, and on the vertical tail leading edge.

These changes consisted of revision of attachment techniques to improve binding forces, modified gap filler assemblies to prevent detachment, and improved installation and testing techniques to ensure satisfactory compliance with design requirements. Changes to correct deficiencies resulting from flight airloads were re-tested after modification to a-sure satisfactory performance and have been incorporated into the Shuttle orbiter.

-end-

January 7, 1981

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-8 FOR RELEASE: Immediate

Ralph B. Jackson
(805) 258-8381

RECOVERY CONVOY REHEARSED SHUTTLE LANDING

When Space Shuttle astronauts land, the welcome mat will be out at NASA's Dryden Flight Research Center. Orbiter Columbia astronauts John Young and Bob Crippen will be met by a carefully trained and tested ground operations crew.

The crew members, who form the Recovery Convoy, have recently completed a dress rehearsal of post-landing activities in preparation for the landing of Columbia. Called the Mission Verification Test, the rehearsal included convoy activities that help ensure the safety of the astronauts and prepare the Orbiter for reuse.

During the test, the recovery crew used an orbiter mockup, complete with the appropriate interfaces for ground connections. This allowed the crew to accurately simulate their portion of post-landing safety and servicing procedures.

The test took place on the dry lakebed at Edwards AFB, California, where STS-1, the Columbia, is expected to land in April. Some of the simulated activities activities included testing for the presence of toxic or explosive vapors and gases, and cooling of the Orbiter. Cooling is carried out by circulating freon through the Columbia's cooling

-more-

system and cool air through its duct system.

To better simulate the landing, a NASA Dryden T-38 jet aircraft flew the Orbiter's planned flight path from 40,000 feet altitude to landing. Also, Orbiter Flight Test Manager, Deke Slayton, maintained communication with the Recovery Convoy and Flight Director Don Puddy at the Johnson Spaceflight Center in Houston, Texas. The complete Mission Verification Test includes NASA's Dryden, Johnson, and Kennedy Centers and is designed to provide the training and testing necessary for a successful Orbiter mission.

-dfrc-

February 27, 1981

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-9

FOR RELEASE: Immediate

Ralph B. Jackson
(805) 258-8381

MEMO TO EDITORS:

The final pre-flight press conference with astronauts John Young and Robert Crippen, prime crew for the maiden flight of the Space Shuttle Columbia, will be held Monday, March 9, at 9:00 a.m. CST (7:00 a.m. PST), at the Johnson Space Center, Houston, Texas.

NASA Dryden will make the conference available to all interested press, via satellite, and have audio/video available in the Dryden auditorium.

Press may partake in the question and answer session of the press conference at NASA Dryden through the audio voice distribution.

Those press interested in attending should arrive at the NASA Dryden Auditorium, located in the Visitors Information Center, no later than 6:30 a.m., PST, Monday, March 9.

For further information contact Deborah Blowers, External Affairs, NASA Dryden (805) 258-8381.

-dfrc-

NOTE: Audio distribution will be available.

March 4, 1981

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-17 FOR RELEASE: Immediate

Ralph B. Jackson
(805) 258-8381

MEMO TO EDITORS:

NASA Dryden's Public Affairs Office will present a briefing on media operations for the landing of the Space Shuttle. The briefing will be held 9:00 a.m., March 31, at the ISF Auditorium at NASA's Dryden Flight Research Center. Purpose of the meeting is to explain press facilities, locations, and what NASA will provide. Weather conditions permitting, simulated Shuttle landing approaches will be flown by T-38 aircraft.

-dfrc-

March 24, 1981

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-18

FOR RELEASE: Immediate

Jim Kukowski
(805) 258-8381

Les Reinertson
(805) 258-8381

ALSO BEING RELEASED AT NASA HEADQUARTERS, KENNEDY SPACE CENTER, AND JOHNSON SPACE CENTER

SPACE SHUTTLE COLUMBIA TO BE RETURNED TO FLORIDA

"That Magnificent Flying Machine", NASA's Space Shuttle orbiter Columbia is being prepared for its return flight to the Kennedy Space Center in Florida. The 100-ton spacecraft will be ferried from the Dryden Flight Research Center, Edwards, California, to the Kennedy Space Center aboard a 747 jet aircraft modified to carry Space Shuttle orbiters. Departure date from Dryden is expected no earlier than April 24.

The cross country trip is scheduled to take two days. A re-fueling and overnight stop will be made at Tinker Air Force Base, near Oklahoma City, Oklahoma. The 747/orbiter combination will arrive at the Kennedy Space Center the following day.

Technicians have been working around the clock deservicing the DC-9 size spacecraft. Numerous systems aboard the Columbia must be cleared of toxic materials, fuel cells purged and a thorough inspection of the more than 30,750 thermal protection system tiles must be conducted before the Columbia is loaded atop the 747 for its piggy-back ride to Florida.

-more-

In addition, to improved flight characteristics of the tandem aircraft, a streamlined tailcone will be attached to the aft end of the orbiter to cover the three main liquid fuel rocket engines.

NASA officials report that the Columbia is in excellent condition following its 54-½ hours space mission.

Donald K. "Deke" Slayton, Orbital Flight Test Manager and former astronaut, will be the senior NASA official accompanying the Columbia back to the Kennedy Center.

The 747/orbiter will land on the 15,000 foot Shuttle Landing Facility at the Kennedy Space Center, be demated and towed to the Orbiter Processing Facility where it will then undergo servicing in preparation for its next flight in four or five months.

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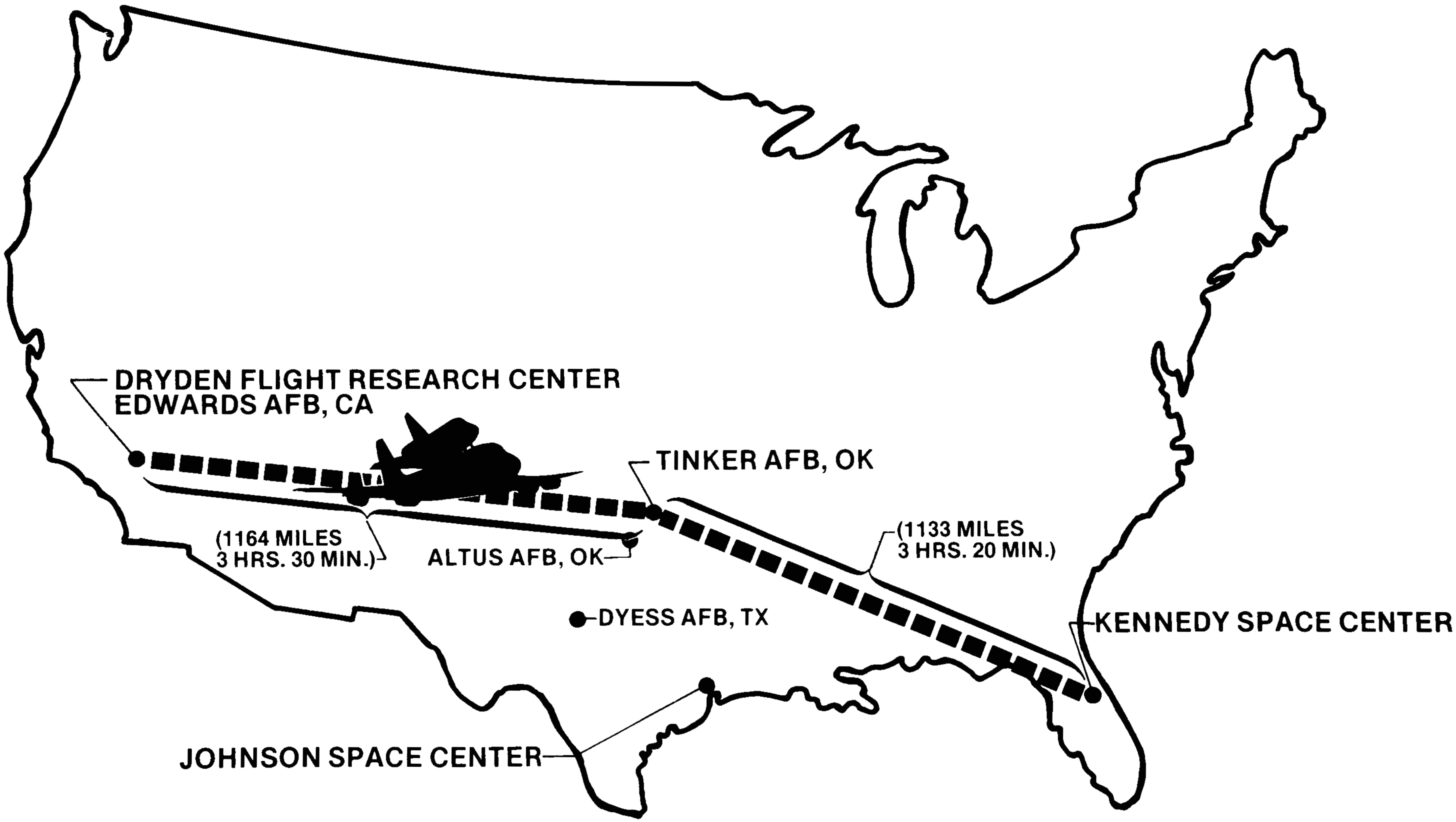
(End of General Release. See additional information)

Route of the Space Shuttle Columbia from Dryden Flight Research Center to Kennedy Space Center



SPACE SHUTTLE ORBITER COLUMBIA

The Space Shuttle orbiter Columbia completed its first space flight on April 14, 1981, when it landed on Rogers Dry Lake at Edwards Air Force Base, California. It's condition upon return was deemed excellent by program officials of the National Aeronautics and Space Administration.

Columbia was launched from the Kennedy Space Center, Florida at 7:00 a.m. EST, April 12. The spacecraft was manned by astronauts John Young and Robert Crippen. The first mission of the Columbia lasted 54.5 hours and was described "better than could be expected".

Columbia is the first of four orbiters to be built. Subsequent orbiters are Challenger, Discovery and Atlantis. Following four flight tests, Columbia will be returned to the Rockwell International facility at Palmdale, California, where it will undergo refurbishing. Ejection seats, now in the Columbia for the first four flights, will be removed. It will be prepared to carry a crew of three and as many as four passengers.

Astronauts Young and Crippen reported during the first flight (STS-1) that it was a "remarkable flying machine". Only a few minor problems occured and none were serious enough to jeopardize the flight.

At launch, the spacecraft weighed over 100-tons and was attached to a large external fuel tank flanked by two large solid rocket boosters. The combination of liquid and solid fuel rocket engines provided 6.5 million pounds of thrust to lift the Columbia into earth orbit.

At liftoff, the liquid fuel main engines and the solid rocket boosters quickly powered the Columbia off the launch pad. Two and 1/2 minutes into the ascent the solid rocket boosters burned out and were jettisoned. The three liquid fuel main engines continued to fire for six more minutes.

Shortly before reaching earth orbit, the main engines shut down and the large external tank was jettisoned. Two smaller rocket engines (Orbital Maneuvering System) in the aft end of the Columbia fired and provided the thrust to place Columbia in earth orbit.

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During most of the Columbia's first space mission the astronauts remained in the upper cabin and in their seats, except for duties that required them to move around in the weightless environment of space.

Following completion of the mission in space, the astronauts prepared for reentry. Turning the Columbia around so that the OMS engines faced the direction of flight, the engines were fired, slowing the Columbia's velocity. The orbiter was then turned around to face the heat build as it descended through the atmosphere.

As the orbiter began to encounter the atmosphere, the Thermal Protection System rejected the tremendous heat build-up experienced from friction with the atmosphere.

Columbia, literally a "space truck" the size of a DC-9 jet aircraft, landed on Rogers Dry Lake at Edwards Air Force Base in full view of several hundred thousand spectators who gathered for the historic event.

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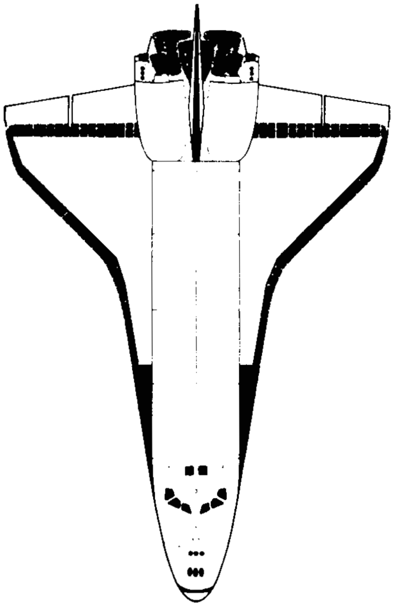
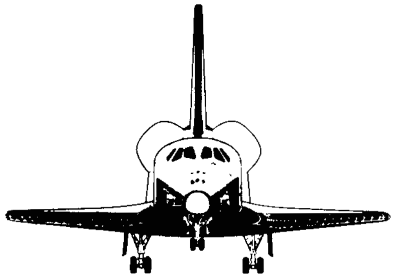
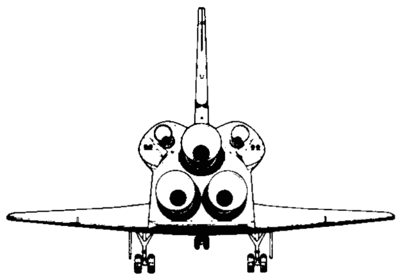


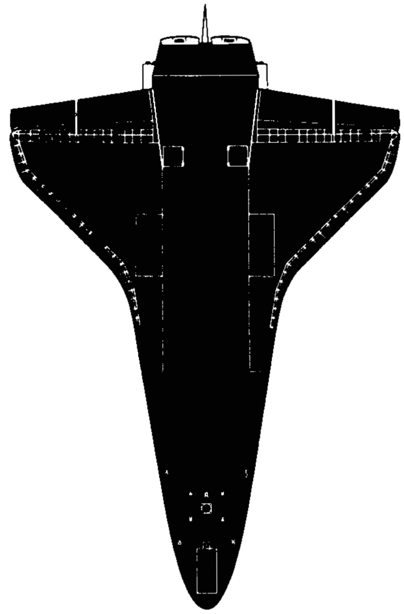
TOP VIEW



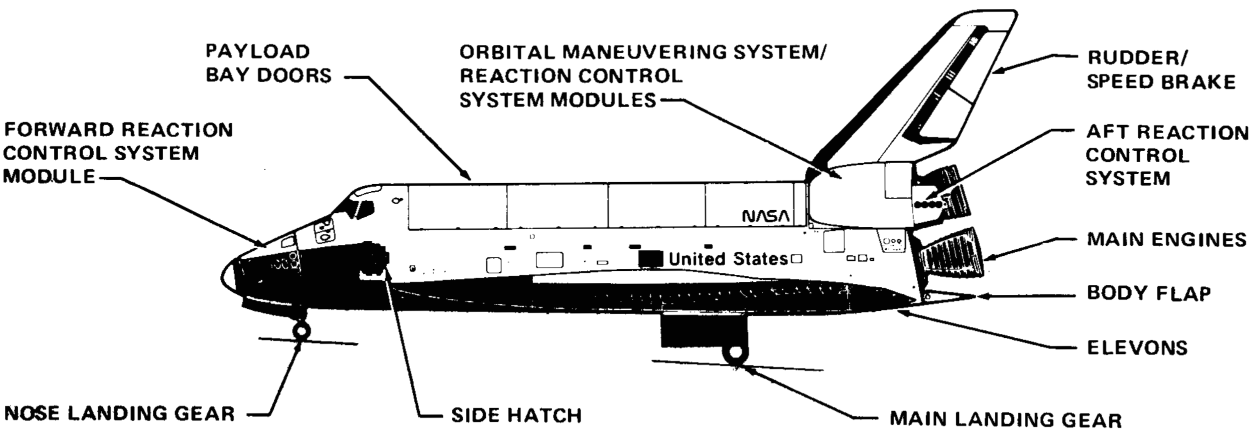
FRONT VIEW



REAR VIEW



BOTTOM VIEW



DIMENSIONS AND WEIGHT

WING SPAN	23.79 m	(78.06 FT)
LENGTH	37.24 m	(122.17 FT)
HEIGHT	17.25 m	(56.58 FT)
TREAD WIDTH	6.91 m	(22.67 FT)
GROSS TAKEOFF WEIGHT		VARIABLE
GROSS LANDING WEIGHT		VARIABLE
INERT WEIGHT (APPROX)	74 844 kg	(165 000 LB)

MINIMUM GROUND CLEARANCES

BODY FLAP (AFT END)	3.68 m	(12.07 FT)
MAIN GEAR (DOOR)	0.87 m	(2.85 FT)
NOSE GEAR (DOOR)	0.90 m	(2.95 FT)
WINGTIP	3.63 m	(11.92 FT)

DESERVICING THE COLUMBIA

For more than a week the orbiter Columbia has been undergoing deservicing that will prepare it for its trip back to Kennedy Space Center and eventual relaunch. The deservicing takes place in NASA Dryden's Mate/Demate Device, a large 100-foot high open steel truss-work structure that permits workers to move in close to the space-craft's vital areas.

During the days following Columbia's faultless re-entry from space and landing, ground personnel have been working around the clock in a painstaking, detailed deservicing procedure. Since the orbiter is one of the most complex space systems ever developed, its deservicing is, necessarily, not simple. In addition, each step in the deservicing process is carefully documented so future activities may be quicker or improved.

Deservicing the orbiter involves removal or containment of hazardous propellants such as toxic hypergolics and cryogenics in-specting the various orbiter systems including its Thermal Protection System, and setting up the orbiter with ferry equipment that allows it to be perched on the Boeing 747 Shuttle Carrier Aircraft. This includes the installation of the 17 piece tailcone assembly which smooths the airflow around the orbiter so the 747 flight crew can control the mammoth craft. Various ferry locks are installed to pre-vent the spacecraft's elevons rudder and other control surfaces from moving in flight and damaging its control system.

When Columbia's systems are finally safed for its earthly flight, it will be raised to the 60-foot level of the Mate/Demate Device and connected with the 747. This connection includes its girder-like supports, as well as power and control systems. Soon afterward the two siamesed aircraft will wing their way across the country to return the orbiter to its launch place for the next orbiter flight in space.

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SHUTTLE CARRIER AIRCRAFT (SCA)

The Shuttle Carrier Aircraft (SCA) is a modified Boeing 747 originally purchased by American Airlines in 1970.

In July 1974, NASA purchased the aircraft for $15 million and redesignated it N905NA(SA). First use of the aircraft was in a flight research program conducted by NASA's Dryden Flight Research Center to investigate the problems associated with wake vortex flow from wide body jet transports. Following the program the 747 was returned to Boeing for modifications in April of 1976.

While at Boeing, the 747 was modified to carry the Space Shuttle orbiter. Its main structure was reinforced to support the weight of the 150,000 lb (67,500 kg) orbiter. Forward and aft supports and adapters were positioned atop the fuselage to carry the orbiter, and tip fans were added to the plane's horizontal stabilizer to provide added aerodynamic stability during mated flights. Modifications were also made in the cockpit for controls and displays necessary for air launching and ferry missions.

Because of the increased weight of the Shuttle and the requirement to achieve as high an altitude as possible for ALT launch, the 747's Pratt and Whitney JT9D-3A engines were converted to a JT9D-7AH configuration, increasing takeoff thrust from 43,500 lbs (19575 kg) to 46,950 lbs (21,128 kg). A special increased climb thrust rating will be used which will permit the engines to climb (at altitude) using sea level temperature limits. A 10-minute restriction is imposed for this rating.

The inside of the 747 was stripped of seats, galleys, etc., resulting in a weight of 342,000 lbs (153,900 kg) unfueled. Adding fuel and the orbiter, takeoff weight of the combination is 585,000 lbs (263,250 kg). Length of the 747 itself is 225 feet (68 meters). Wingspan is 195 feet (59 meters). Height of the 747/orbiter combination is 75 feet (23 meters).

In the Approach and Landing Tests, the orbiter was carried aloft on the 747 in a series of captive manned and unmanned flights. In April of this year, the first manned space flight of the orbiter took place.

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The 747 will be used to ferry the orbiter back to its launch site, John F. Kennedy Space Center, Florida. The 747 will also serve as a ferry aircraft in other future missions.

The 747 crew consists of the pilot, co-pilot and two flight engineers.

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NOTE TO EDITORS:

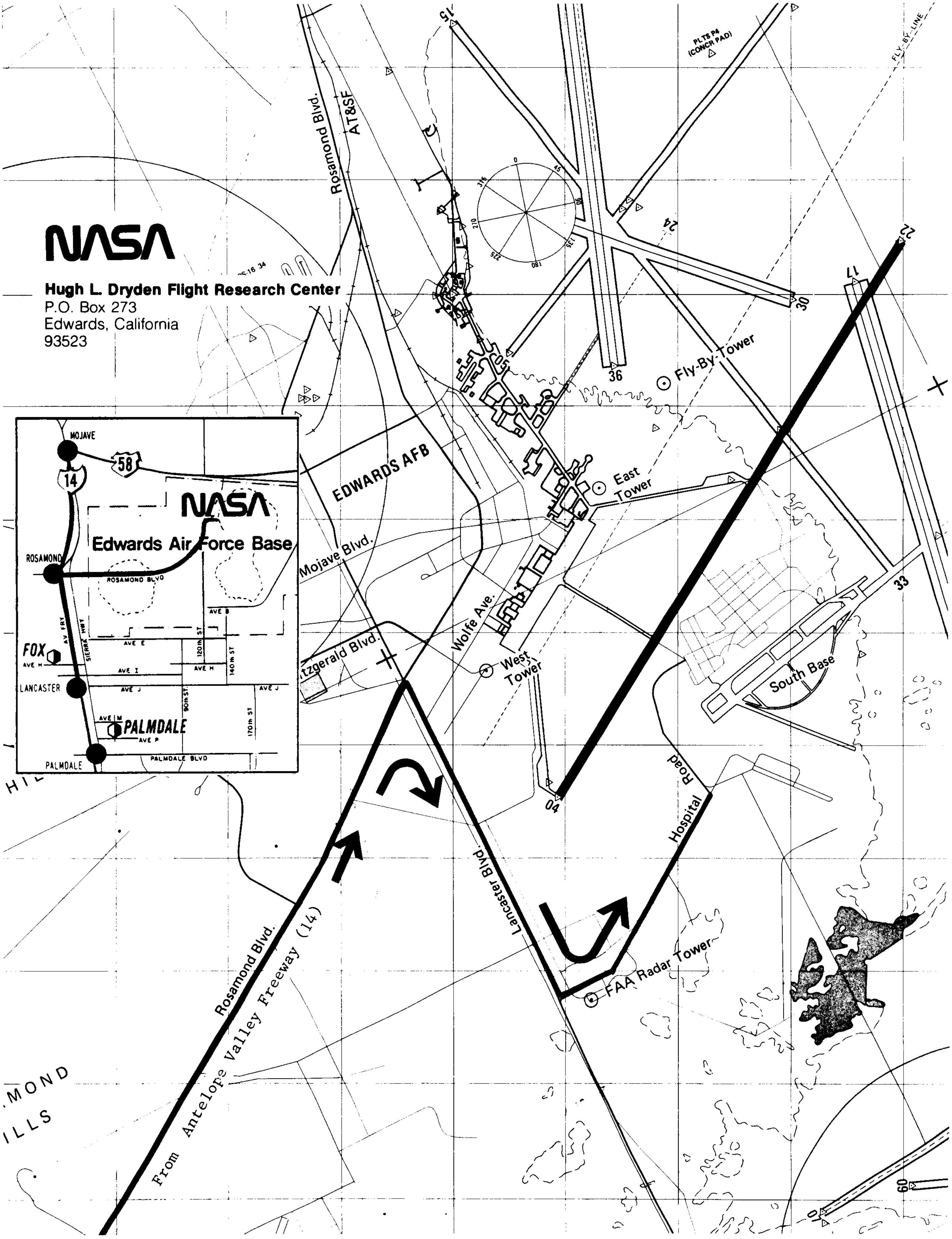
The Space Shuttle orbiter Columbia is scheduled to depart the NASA Dryden Flight Research Center, at Edwards Air Force Base, no earlier than 7:00 a.m., PST, Friday, April 24. Due to uncertainties of weather and final departure preparations, there is the probability of a delay in departure.

To prevent an unnecessary trip to Edwards AFB, media are urged to call (805)258-4464 for daily status reports on the readiness of the 747/orbiter takeoff.

Takeoff will be from Runway 22, Edwards AFB.

Media will be permitted to view the takeoff from Hospital Road. No one is allowed closer than 1500 feet from the centerline of the runway.

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California
93523



NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-21 FOR RELEASE: Immediate

Sharon Wanglin
(805) 258-8381

DRYDEN PREPARES FOR TURBULENCE TESTS

NASA Dryden is readying its newly refurbished B-57B Canberra bomber to be the test airplane for its upcoming Atmospheric Turbulence Measurement Program.

The program is constructed to gather information on turbulence patchiness and spanwise gust gradients -- sudden changes in wind creating abrupt and uneven pressure forces on different areas of an aircraft. Aeronautical engineers will use the information to develop improved designs in aircraft construction and operation. They will give special attention to approach and take-off during strong wind shears and unstable temperature conditions.

Researchers consider this program most important to flight safety. Sophistication of modern aircraft and need for all-weather operations call for increased knowledge in designing large vehicles and suitable control systems. Commercial airliners reportedly have suffered a number of bad incidents in recent years because of unpredictable performance in wind shears.

Project engineers chose the B-57B because of its ruggedness and ability to withstand high G-forces. The craft has extremely

-more-

rigid wings and is strong enough to recover from upsets during severe turbulence. Its cockpit has space for two crew members -- allowing a meteorologist to fly as an observer during tests.

Dryden's Project Manager for the Turbulence Program is Wen Painter. Painter says that scientists do not yet quite understand the phenomenon of wind shear, so they expect the flight tests to produce valuable material.

Dryden Flight Research Center will manage the entire flight test program. The B-57B will fly tests at Edwards Air Force Base, Denver, Oklahoma City, Huntsville, Cape Canaveral and Wallops Island -- all of which possess distinctive types of turbulence. Other NASA centers participating in the joint program include Ames Research Center, Langley Research Center, and Marshall Space Flight Center.

-dfrc-

2 June 1981

NASA News

National Aeronautics and
Space Administration

Ames Research Center
Hugh L. Dryden Flight Research Facility
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-27 FOR RELEASE: Immediate

Ralph Jackson
805-258-8381

MEMO TO EDITORS:

NASA Dryden's Public Affairs Office will present two briefings on media facilities and procedures for covering the third landing of the Space Shuttle, now scheduled for March 29.

The first briefing will be held as part of the Southern California Chapter of Aviation/Space Writers Association dinner meeting on February 24 at the Valley Hilton Hotel, located at the intersection of the San Diego and Ventura Freeways, Sherman Oaks, California. Dinner details and reservations can be obtained by calling Sandra Townsend at 213-847-2812. There will be two other briefings that night on Shuttle payloads and Shuttle main engines.

The second briefing will be held at the visitors auditorium at NASA Dryden at 10:00 a.m. on March 2.

The only difference in the two briefings will be that the second briefing will include a tour of the press sites.

-DFRF-

February 16, 1982

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
Edwards, California 93523
AC 805 258-3311

RELEASE NO: 81-28

FOR RELEASE: Immediate
Also released in Washington D.C.

Sharon Wanglin
(805) 258-8381

DRYDEN MATHEMATICIAN OPENS NEW FRONTIER IN COMPUTER IMAGING

The hidden-line problem has confounded experts in computer graphics since the technology of computer-created images began. But mathematician David Hedgley of NASA's Dryden Flight Research Center has produced an efficient and effective solution -- a solution that can be applied to all solid objects and surfaces regardless of complexity.

The problem results from the fact that a computer does not "see" a solid object the way we do. The computer defines the whole object at once without regard to a particular side or perspective. Consequently, when asked to produce a picture of the object, the computer will show all of its surfaces and angles and curves regardless of whether they are located on the side facing the viewer or on the back, which the eye cannot see. This results in confusion and ambiguous pictures.

An effective solution requires the computer to depict an object from a specific viewpoint just as the eye would see it, and do so efficiently. Furthermore, the solution must work with any object or group of objects, no matter how complex. "We needed to make it general and make it very fast"; says Hedgley, "that's what I've done".

-more-

Mathematicians around the world have worked the problem for years; and some achieved partial solutions. But until Hedgley's solution none could be applied to every three-dimensional scene; and few were reliably accurate. In fact, specialists considered the hidden-line problem to be the most difficult in the field.

Hedgley's program has just undergone computer testing at Lawrence Livermore Laboratory by experts Bruce Brown and Steve Levine. The tests verified the solution's workability with respect to speed, accuracy and applicability to all cases. Brown and Levine found the speed to be surprisingly high. Previous solutions broke down when dealing with complex scenes because execution time increased to the square of the number of polygons. Hedgley's solution avoids this problem, so it is not hampered rendering complex objects.

Dryden researchers are starting to use Hedgley's solution in aircraft experimentation. They are finding it highly effective for analyzing flutter problems in unsteady aerodynamics. In addition, they have begun creating simple structures on second-generation computers and expect to expand this into simulated aircraft flight -- a task requiring a third-generation computer. Such simulated flight will enable a pilot to practice chasing a synthetic target airplane by watching the image on a cathode ray tube. Speed becomes an essential ingredient in this sort of exercise, where the program must be executed rapidly.

Hedgley's solution is applicable to a wide variety of fields, including automotive design, architecture, metallurgy, and anything else that can be expressed as a function of two variables.

-dfrc-

NASA News

National Aeronautics and
Space Administration

Hugh L. Dryden Flight Research Center
P.O. Box 273
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AC 805 258-3311

RELEASE NO: 81:29 FOR RELEASE: Immediate

Les Reinertson
(805) 258-8381

CHAMBERS OF COMMERCE TO ISSUE SHUTTLE VIEWING PASSES FOR NASA

The National Aeronautics and Space Administration's Dryden Flight Research Center will provide car passes to view the landing of the Space Shuttle Columbia to 50 California Chambers of Commerce for distribution to the public in their areas. The car passes will be issued on a first-come, first-serve basis and will be available at the participating chambers no earlier than September 21.

The landing, now expected to take place October 14, 1981, marks the Orbiter Columbia's second return from space and over 40,000 car passes will be distributed so the public may view it. No entry to the shuttle viewing site will be allowed without the special car pass.

Each pass admits the occupants of one vehicle to the viewing site situated at the east side of Rogers Dry Lake on Edwards AFB. The pass is valid for any type of vehicle and its occupants. The car pass will provide directions for entry onto the facility.

Chambers of commerce distributing the Space Shuttle car passes include:

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Shuttle Viewing Passes continued. . .

Anaheim Chamber of Commerce
Apple Valley Chamber of Commerce
Greater Bakersfield Chamber of Commerce
Barstow Chamber of Commerce
Burbank Chamber of Commerce
Canyon Country Chamber of Commerce
Century City Chamber of Commerce
Greater Chico Chamber of Commerce
Concord Chamber of Commerce
Conejo Valley Chamber of Commerce
Fresno County & City Chamber of Commerce
Glendale Chamber of Commerce
Granada Hills Chamber of Commerce
Hollywood Chamber of Commerce
Kern County Board of Trade
La Canada Flintridge Chamber of Commerce
Lakewood Chamber of Commerce
Lancaster Chamber of Commerce
Long Beach Area Chamber of Commerce
Los Angeles Area Chamber of Commerce
Merced County Chamber of Commerce
Mojave Chamber of Commerce
Oakland Chamber of Commerce
Orange County Chamber of Commerce
Oxnard Chamber of Commerce
Palmdale Chamber of Commerce
Palm Springs Chamber of Commerce
Palos Verdes Peninsula Chamber of Commerce
Pasadena Chamber of Commerce
Pomona Chamber of Commerce
Redlands Chamber of Commerce
Redwood City-San Mateo County Chamber of Commerce
Ridgecrest Chamber of Commerce
Greater Riverside Chamber of Commerce
Sacramento Metropolitan Chamber of Commerce
Salinas Chamber of Commerce
San Bernardino Area Chamber of Commerce
San Diego Chamber of Commerce
San Fernando Valley Regional Chamber of Commerce
San Francisco Chamber of Commerce
San Jose Chamber of Commerce
San Luis Obispo Chamber of Commerce
Santa Barbara County & City Chamber of Commerce
Simi Valley Chamber of Commerce
Greater Stockton Chamber of Commerce
Greater Ventura Chamber of Commerce
Victorville Chamber of Commerce
Western Los Angeles Regional Chamber of Commerce
Whittier Area Chamber of Commerce

-dfrc-

NASA News

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P.O. Box 273
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RELEASE NO: 81:32 FOR RELEASE: IMMEDIATE

Les Reinertson
(805) 258-8381

MANKE NAMED TO HEAD DRYDEN AND AMES FLIGHT OPERATIONS

John A. Manke has been named to head the newly formed Directorate of Flight Operations, Ames Research Center, which resulted from the consolidation of NASA's Dryden Flight Research Center and Ames Research Center. The consolidation of the two centers, effective October 1, 1981, has as its primary objective, the integration and strengthening of aeronautical research activities and consolidation of NASA flight testing at Dryden.

As Director of Flight Operations, Manke will have the responsibility for aircraft operations at both the Ames and Dryden facilities. In addition, he will have the responsibility for on-site management of the Dryden Flight Research Facility.

Prior to this assignment, Manke served as Director of the Flight Operations and Support Directorate at Dryden. He joined Dryden in 1962 as a research engineer and later became a research pilot, testing advanced craft such as the wingless lifting bodies, forerunners of the Space Shuttle. He was project pilot on the X-24B and also flew the M-2, HL-10 and X-24A lifting bodies. He made the first supersonic flight of a lifting body and the first landing of a lifting body on a hard surface runway.

A member of the Society of Experimental Test Pilots, Manke, his wife Marilyn, and their five children reside in Lancaster, California.

-dfrf-

October 6, 1981

NASA Facts

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P.O. Box 273
Edwards, California 93523

RELEASE NO: 81-34 FOR RELEASE: IMMEDIATE

Jim Kukowski
Les Reinertson
(805) 258-8381

SPACE SHUTTLE TO BE RETURNED TO KENNEDY SPACE CENTER

The Space Shuttle orbiter Columbia is being readied for its return trip to the Kennedy Space Center, Florida. The ferry flight will be made atop a 747 carrier aircraft modified to carry the 200,000 pound spacecraft.

Deservicing of the Columbia, following its 54 hour space mission, is being done at NASA's Dryden Flight Research Facility at Edwards Air Force Base, California.

The 747/Columbia combination is scheduled to depart the Dryden Facility no earlier than November 25 for Florida. The ferry flight is expected to take two days.

A refueling and overnight stop will be made at Bergstrom Air Force Base near Austin, Texas. Dyess Air Force Base has been designated the alternate landing site.

Preparations for the flight are now underway. Technicians are carrying out numerous tasks to prepare Columbia for the

-more-

flight. These include draining liquid hydrogen and oxygen from the vehicle, removing pyrotechnic devices, and purging fuel cells and toxic chemicals used in the propulsion systems.

To improve flight characteristics on the cross country journey, a streamlined tailcone will be attached to the aft end of the orbiter to cover its three main engines and two orbital maneuvering system engines.

Donald K. "Deke" Slayton, Orbital Flight Test Manager and astronaut, will be the senior NASA official accompanying the Columbia back to Florida.

When the 747/orbiter arrives at the Kennedy Space Center it will land on the 15,000 foot Shuttle landing strip, be demated from the 747 and towed to the Orbiter Processing Facility. There it will undergo additional deservicing and inspection before it is prepared for the next flight, now tentatively scheduled for March 1982.

-dfrf-

(END OF GENERAL RELEASE. SEE ADDITIONAL INFORMATION)

DESERVICING THE COLUMBIA

For more than a week the orbiter Columbia has been undergoing deservicing that will prepare it for its trip back to Kennedy Space Center and eventual relaunch. The deservicing takes place in NASA Dryden's Mate/Demate Device, a large 100-foot high open steel truss-work structure that permits workers to move in close to the spacecraft's vital areas.

During the days following Columbia's re-entry from space and landing, ground personnel have been working around the clock in a painstaking, detailed deservicing procedure. Since the orbiter is one of the most complex space systems ever developed, its deservicing is, necessarily, not simple. In addition, each step in the deservicing process is carefully documented so future activities may be quicker or improved.

Deservicing the orbiter involves removal or containment of hazardous propellants such as toxic hypergolics and cryogenics, inspecting the various orbiter systems including its Thermal Protection System, and setting up the orbiter with ferry equipment that allows it to be perched on the Boeing 747 Shuttle Carrier Aircraft. This includes the installation of the 17 piece tailcone assembly which smooths the airflow around the orbiter so the 747 flight crew can control the mammoth craft. Various ferry locks are installed to prevent the spacecraft's elevons rudder and other control surfaces from moving in flight and damaging its control system.

When Columbia's systems are finally safed for its "earthly" flight, it is raised to the 60-foot level of the Mate/Demate Device and connected with the 747. This connection includes its girder-like supports, as well as power and control systems. Soon afterward the mated aircraft will wing their way across the country to return the orbiter to its launch place for the next orbiter flight in space.

###

SHUTTLE CARRIER AIRCRAFT (SCA)

The Shuttle Carrier Aircraft (SCA) is a modified Boeing 747 which was originally purchased by American Airlines from Boeing in October of 1970.

At time of purchase it was a standard Boeing 747-100 capable of carrying 374 passengers and baggage a distance of 5900 statute miles (9516 km). The standard Boeing 747-100 weighed 710,000 lbs (319,500 kg) when operating at maximum gross weights, and was flown by American Airlines for 8899 hours with 2985 landings.

In July 1974 NASA purchased the aircraft from American Airlines for $15 million and redesignated it N905NA(SA). First use of the aircraft was in a flight research program conducted by NASA's Dryden Flight Research Center to investigate the problems associated with wake vortex flow from wide body jet transports. Following the program the 747 was returned to Boeing for modifications in April of 1976.

While at Boeing, the 747 was modified to carry the Space Shuttle Orbiter. Its main structure was reinforced to support the weight of the 200,000 lbs (70,700 kg). Forward and aft supports and adapters were positioned atop the fuselage to carry the Orbiter, and tip fans were added the the plane's horizontal stabilizer to provide added aerodynamic stability during mated flights. Modifications were also made in the cockpit for controls and displays necessary for air launching and ferry missions.

Because of the increased weight of the Shuttle and the requirement to achieve as high an altitude as possible for ALT launch, the 747's Pratt and Whitney JT9D-3A engines were converted to a JT9D-7AH configuration, increasing takeoff thrust from 43,500 lbs (19,575 kg) to 46,950 lbs (21,128 kg). A special increased climb thrust rating will be used which will permit the engines to climb (at altitude) usings sea level temperature limits. A 10-minute restriction is imposed for this rating.

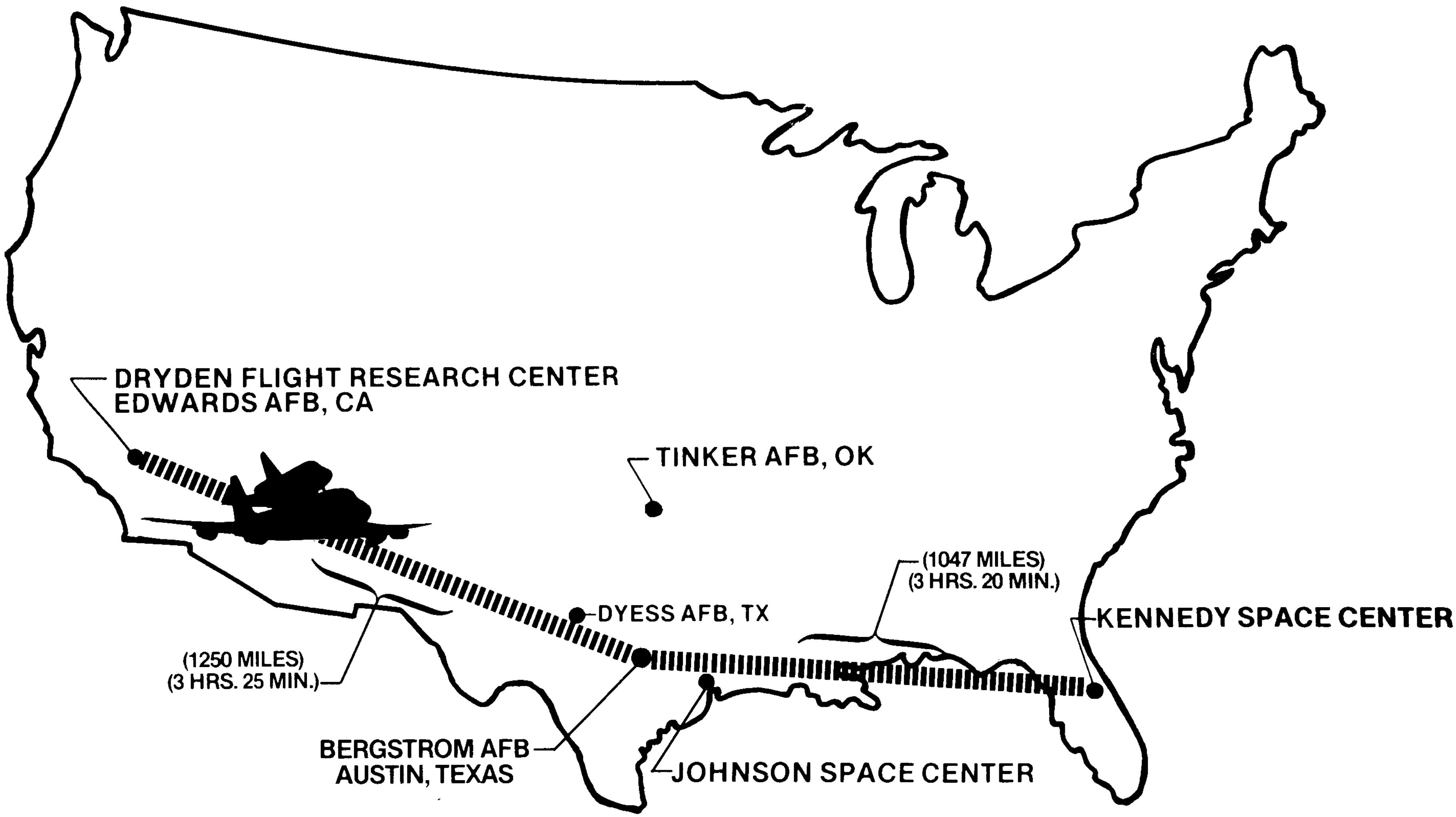
The inside of the 747 was stripped of seats, galleys, etc. resulting in a weight of 342,000 lbs (153,900 kg) unfueled. Adding fuel and the Orbiter, takeoff weight of the combination will not exceed 713,000 (323,416 kg). Length of the 747 itself is 225 feet (68 meters). Wingspan is 195 feet (59 meters). Height of the 747/Orbiter combination is 75 feet (23 meters).

In the Approach and Landing Tests at Dryden, the Orbiter Enterprise was carried aloft on the 747 in a series of captive manned and unmanned flights. The 747 was used to ferry the Orbiter Columbia back to Kennedy Space Center, Florida after its first flight in space and landing.

The 747 crew consists of the pilot, co-pilot and two flight engineers.

###

Route of the Space Shuttle Columbia from Dryden Flight Research Center to Kennedy Space Center



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RELEASE NO: 82: 8 FOR RELEASE: Immediate

Sharon Wanglin
(805) 258-8381

NASA's B-57 Supports JAWS Program

NASA's B-57, outfitted to collect data on spanwise wind gusts, returns to Dryden Flight Research Facility last week, following three weeks of flying out of Denver. The durable aircraft and its Dryden project team members are cooperating with the National Center for Atmospheric Research and the University of Chicago in the Joint Airport Weather Studies Project -- known as JAWS.

JAWS is dedicated to understanding and predicting microbursts -- small, intense downward bursts of air that often accompany thunderstorms. For some time, researchers have suspected microbursts of contributing to certain airline accidents. JAWS' goal is to learn how to forecast where and when microbursts will occur, so airplanes can avoid them.

NASA has overlapping interests in studying microbursts, and therefore is supporting JAWS with the B-57 and contributing to program funding. But in addition, NASA has it's own program with

- more -

the B-57, studying gust gradients. NASA's chief goal is to get information for use in designing new airplane systems, with built-in windshear avoidance.

Dryden B-57 Program Manager Wen Painter says that the Denver flights supplied a lot of valuable data. "It will take a year to 18 months getting all the data analyzed;" says Painter, "but we already can pretty well say where wind shear problems are going to happen."

Fitzhugh Fulton, one of two NASA pilots who flew the B-57 in the storms over Denver, says Colorado weather cooperated with the project. "We got severe turbulence occasionally and moderate turbulence a lot," says Fulton, "It gave us a good ride."

Once home at Dryden, the B-57 will get new instrumentation, and then perform gust gradient test flights in the hilly areas around Edwards Air Force Base. It is scheduled to go to Norman, Oklahoma next Spring, for more storm flying.

26 July 1982

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RELEASE NO: 82-10 FOR RELEASE: Immediate

Sharon Wanglin
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DRYDEN'S RECORDED NEWS PHONE CARRIES TEST FLIGHT INFORMATION

NASA's Dryden Flight Research Facility now is updating its telephone recorded message service for news media with flight test activities on aeronautics projects, in addition to providing the latest information on Shuttle launch preparations.

Dryden Public Affairs will update the phone message each Monday. This policy starts immediately and will continue until the next Shuttle launch. From launch through ferry flight, the recorded message will deal exclusively with news pertaining to Shuttle activities.

The recorded message phone number is (805) 258-4464. It is available on a 24-hour basis.

27 July 1982

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RELEASE NO. 82-12 **FOR RELEASE: Immediate**

Les Reinertson
(805) 258-8381

**DRYDEN FLIGHT RESEARCH FACILITY AWARDS
CONTRACT TO DEVELOP FLIGHT LOADS DATA SYSTEM**

A $4,333,000 contract to design, manufacture, test and install a data system that will help NASA researchers put aircraft and spacecraft through rigorous, yet scientific simulation and analysis, has been awarded to Teledyne Industries, Teledyne Controls of Los Angeles, CA. The system, called DACS II, will be located at NASA's Dryden Flight Research Facility, Edwards, California.

DACS II (Data Acquisition and Thermal/Mechanical Loads Control System) will enable Dryden researchers to provide real time simulation of heating and force-loads on full-scale aircraft and space vehicles, as well as various parts of these craft. With this system up to 20 million watts of electrical energy can be channeled to radiant heaters producing temperatures to 2,000 degrees Fahrenheit (1100 degrees Celsius) to simulate aircraft heating caused by air friction at high speeds.

-more-

In addition, DACS II will be capable of real time acquisition and display of data from large arrays of sensors and will provide adaptive control of heating equipment. Over 1,200 channels of temperature, strain, pressure, deformation and load information will be able to be recorded and analyzed by DACS II.

Other features of the DACS II system include the capability of conducting three independent tests simultaneously and providing test control, system monitoring, as well as test engineering and analysis. Additionally, DACS II will be able to provide data interfacing between the control/monitoring functions and the engineering/analysis functions without interfering with each others' critical processing, display, control or analysis functions.

DACS II is expected to be on line and testing this country's most advanced aircraft and spacecraft in 1984.

-NASA-Dryden-

September 15, 1982

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RELEASE NO: 82-13 FOR RELEASE: Immediate

Sharon Wanglin
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SPACE SHUTTLE ENTERPRISE PERFORMS FAILURE DETECTION EXPERIMENTS

The Enterprise -- NASA's first Space Shuttle and only Orbiter not slated to orbit -- is still hard at work in the nation's Space Program. Presently residing at NASA's Dryden Flight Research Facility, the first Shuttle is serving as testbed for engineers developing a way to foresee and deter structural trouble spots resulting from wear and tear over years of service.

Because all pre-Shuttle spacecraft were one-mission-only vehicles, spaceship fatigue is a new problem. Each Orbiter is scheduled to fly 100 missions; so NASA wants to find an efficient and reliable method of detecting potential trouble spots before they develop into problems. To be useable, the method must find any existing weaknesses without causing damage to the Orbiter's structure.

NASA researchers think they may have found their method in a

- more -

technology called modal analysis. This technique uses extremely sensitive acceleration measurements for detecting a structure's reaction to rapidly varying forces. Electromagnetic shakers apply forces to part of the surface. Accelerometers attached to numerous points over the surface pick up the structure's response, then feed it into a minicomputer.

Modal testing works by allowing engineers to track frequency changes caused by any damage resulting from repetitive journeys into space. Engineers start by performing an analysis which defines the vehicle's normal dynamic characteristics. Should they later find changes in these characteristics, they would know the structure is damaged. Computer-assisted study of the changes would enable them to pinpoint and correct the damaged area.

NASA researchers are using Enterprise to validate the usefulness of modal testing as an inspection tool for all Space Shuttles. Pretesting the technique on disembodied parts of an Orbiter have given very promising results -- clearly identifying damage which was missed in visual X-ray and ultrasonic inspections. But piecemeal testing of parts does not give a valid picture of the craft's entire structure. Since parts behave differently when removed, engineers must test a whole Orbiter to be certain this

- more -

type of analysis will prove reliable. Built to the same dimensions as her orbiting counterparts, Enterprise is uniquely qualified for the job.

Enterprise will undergo modal testing at Dryden through the end of October. If results are good, NASA may use the method to avert problems on orbiting members of the Shuttle stable.

- NASA Dryden -

21 September 1982

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RELEASE NO: 82-14 FOR RELEASE: Immediate

Sharon Wanglin
805/258-8381

MEMO TO EDITORS:

NASA Public Affairs at Dryden Flight Research Facility will hold a press briefing Thursday, October 21, on news coverage of the Space Shuttle Columbia's fifth landing. Location will be the Visitors Auditorium in the NASA facility at Edwards Air Force Base.

Included in the briefing will be information on press sites, facilities which NASA will provide, rules governing frequency transmitters, and ordering of telephone lines.

The coming flight will be the Shuttle's first operational mission, the first to include mission specialists, the first to launch satellites, and the first to incorporate a space walk in the payload bay. The scheduled landing date at Edwards is November 16.

- DFRF -

October 4, 1982

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Miles Waggoner
Headquarters, Washington, D.C.
(Phone: 202/755-8341)

10/5/82
For Release: Immediate

Sharon Wanglin
Hugh L. Dryden Flight Research Facility
(805) 258-8381

RELEASE NO: 82-15

NASA ACCEPTING ACCREDITATION REQUESTS FOR FIFTH SHUTTLE FLIGHT

NASA is accepting accreditation requests for news media to cover the fifth orbital flight test of the Space Shuttle. Launch is targeted for no earlier than Nov. 11 from Kennedy Space Center, Fla., with mission control at Johnson Space Center, Houston, and landing at Dryden Flight Research Facility, Edwards, Calif., five days later.

The news center will open at Kennedy five days prior to launch, at Johnson three days and Dryden one day prior to launch. Decision on the status of White Sands will be made at a later date.

Requests for accreditation must be made by a news executive on company letterhead, clearly indicating the assignment (reporter, photographer, technician, etc.) of each individual.

-more-

October 5, 1982

Freelance writers and photographers must offer proof of assignment or evidence of professional activity. The accreditation will be valid for all news centers.

Requests should be submitted by Nov. 5 to:

NASA Headquarters
Code LFD-10/Accreditation
Washington, D.C. 20546

Please indicate from which location(s) you plan to cover the mission.

Here is a review of the NASA ground rules for newspersons covering the mission:

- NASA can make no travel or housing arrangements.
- Requests for newsroom space, telephone service and seating assignments should be directed to the center involved.
- Only working newsmen will be accredited at the news centers. Publishers and other news and advertising executives will not be accredited. They should apply to NASA's protocol office.
- Friends, dependents or relatives not covering the mission will not be accommodated. Special arrangements for dependents to view the launch can be made only at the Kennedy news center.
- No one under 16 years will be allowed at the press site under any circumstances. Violation of the rule will result in cancellation of press site privileges for the responsible parties.
- Philatelic publications must be publications for general sale or publications of national organizations. They are restricted to two representatives each. Newsletters of local clubs do not qualify. Representatives of philatelic organizations will not conduct other business while at the press site.

- College news media are limited to two accredited correspondents each for their newspaper, radio or TV station.

- Prime contractors are limited to five representatives and subcontractors are limited to two representatives at any center.

- You must present your letter of acceptance in person and some form of identification to obtain a news badge at the appropriate center. If you lose your accreditation letter, a record that it was issued will be available at each news center.

- Any organization needing still pictures of the mission must have one representative register with the photo office at the Kennedy Space Center or Dryden Flight Research Facility as soon as they arrive. Only one photo card will be issued to each organization. On site photos will be delivered only to organizations meeting deadlines; others will receive photos by mail.

- No alcoholic beverages are allowed on government property.

- Remember that launch dates are subject to change, and you should check as launch time gets nearer.

- A number of these sites, notably Kennedy, Dryden and White Sands are located on large government reservations remote from the motel areas. Ample time should be allowed for travel and gate clearance. You must provide your own transportation.

-end-

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RELEASE NO. 82-16 **FOR RELEASE: Immediate** 10/19/82

Les Reinertson
(805) 258-8381

CUBIC CORPORATION AWARDED CONTRACT TO MODERNIZE NASA FLIGHT SIMULATION AND REMOTELY PILOTED RESEARCH VEHICLE LABORATORY

Cubic Corporation, Cubic Defense Systems of San Diego, California, has been awarded a $2,179,049 contract to design, configure, integrate, install and test a modernized Simulation/Remotely Piloted Research Vehicle (RPRV) computer system for the Simulation and RPRV Laboratory at NASA's Hugh L. Dryden Flight Research Facility, Edwards, California.

NASA Dryden specializes in the use of remotely piloted research vehicles and digital flight control systems requiring complex computer hardware and software systems. Use of computer systems to develop programs for flight simulation and to meet research and operational needs, including the remote flying of high-risk aircraft technology, greatly aids the efficiency and quality of data gathering required for the nation's leadership in advanced aircraft.

-more-

Specifically, the new computer system will be used to develop simulation and control law software to model the behavior of experimental aircraft; to develop production simulation software used for pilot training, flight planning and system performance analysis; and to develop flight code software used for actual aircraft in flight. Additionally, it will be used to perform "iron bird" simulations for testing on-board computers and other flight hardware, including whole aircraft, on a real-time basis; and for performance of actual RPRV flight missions.

The computer system modernization is part of a program that includes the consolidation and enlargement of Dryden's Simulation and RPRV Laboratories. This effort is expected to significantly increase the facility's productivity, data quality and flight research capabilities

-NASA-Dryden-

October 19, 1982

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RELEASE NO. 82-18 **FOR RELEASE: Immediate**

Les Reinertson (805) 258-8381

NASA'S DAST 1 RESUMES FLIGHT TESTING

The DAST (Drones for Aerodynamic Structural Testing) flight test program was resumed at NASA's Dryden Flight Research Facility Wednesday, after the sucessful launch and flight of the DAST 1 vehicle from its B-52 carrier. The DAST program seeks to develop technology that will allow transport and other type aircraft to fly more efficently with lighter, more flexible wings resulting in larger aircraft payloads or greater fuel economy, or combinations of both.

The fifteen minute flight test of the remotely piloted research vehicle demonstrated its flight control and instrumentation systems, as well as its launch and recovery systems. Planned flutter suppression system tests were delayed until next flight due to mechanical problems, according to Don Gatlin, Dryden's DAST Program Manager.

In its first flight since loosing a wing in June, 1980, DAST flew a prescribed program which took it to Mach 0.78 and 18,000 ft. altitude.

-more-

According to DAST Program Manager Hal Murrow, of NASA's Langley Research Center, present wing technology uses a brute force technique to stiffen wings to the point that they can safely approach their flutter boundaries -- that point at which destructive flutter or "flapping" occurs. DAST technology would use computer controlled aerosurfaces, such as ailerons which normally help turn an airplane in flight, to counter the onset of this flutter. Special sensors, or accelerometers, would be used to detect the flutter long befor a pilot could sense them. The sensors would then signal a computer which would then "fly" the wing to counter-act the flutter.

The initial phase of the DAST Program, using the rebuilt ARW-1R wing, is directed toward evaluating analytical techniques for designing and developing a flutter suppression system. Later phases will use a developed system resulting from ARW-1R research, as well as additional control functions. A third phase may incorporate DAST's active flutter suppression system with passive methods of flutter control such as aeroelastic tailoring, according to Murrow. Aeroelastic tailoring is a method of building a wing with composite fibers so that it bends under stress in ways that are more desirable for efficient flight.

-more-

The DAST 1 was piloted remotely from Dryden Flight Research Facility by Thomas C. McMurtry, a NASA Civilian Research Pilot. Upon conclusion of the flight, a parachute system was activated by ground control and the 1,900 lb. DAST vehicle was recovered in mid-air by an Air Force HH-53-C helicopter.

DAST is a joint program of NASA's Dryden Flight Research Facility, Edwards, California and Langley Research Center, Hampton Roads, Virginia.

-NASA-Dryden-

November 4, 1982

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10/10/82

Ralph Jackson
Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

RELEASE NO: 82-19 IMMEDIATE

NOTE TO EDITORS/NEWS DIRECTORS:

PRESS ACCREDITATION RULES STREAMLINED FOR STS-6

NASA has instituted new procedures for press accreditation, beginning with the sixth Space Shuttle mission now scheduled for no earlier than Jan. 24.

All requests for accreditation should be submitted to that center the applicant plans to attend first. As in the past, accreditation badges issued by any NASA center will be honored by the others.

December 10, 1982

Early requests will facilitate processing and reduce the delays and embarrassments incurred by last minute walk-ins.

-more-

Standards for eligibility for covering the mission will be strictly enforced. These standards are attached.

Accreditation requests should be addressed to one and only one of the following addresses and clearly marked ACCREDITATION:

John F. Kennedy Space Center
Public Information (PA-PIB)
Kennedy Space Center, FL 32899

Lyndon B. Johnson Space Center
Office of Public Affairs (AP3)
Houston, TX 77058

Hugh L. Dryden Flight Research Facility
Public Affairs Office
Post Office Box 273
Edwards, CA 93523

Press badges will be issued at the site visited upon presentation of a letter of acceptance, identification issued by the news organization, and one other form of picture identification. For Dryden, badges will be issued at the NASA Guest Services Center located at 44073 N. Sierra Highway, Lancaster, CA 93534. Letters of acceptance will be mailed out up to five days prior to launch from Kennedy and Johnson and five days prior to landing at Dryden. Media who have not received letters for whatever reason must have an original letter of assignment to receive a press badge.

Letters requesting accreditation which have already been sent to NASA Headquarters will be handled by NASA Headquarters and do not need to be resubmitted.

ACCREDITATION CRITERIA

* All requests must be submitted on the letterhead of the news media organization responsible for the applicant's assignment and must be made by a supervisory official other than the applicant.

* Freelancers must have letters of assignment from recognized media or evidence of past professional work for recognized media.

* News media representatives are defined as personnel involved in the gathering, writing, editing and placement of materials for print or the creation of radio, television and motion picture productions. Non-editorial personnel such as those in management, advertising, and public relations will not be accommodated at working press facilities.

* College and universities will be limited to two accredited media representatives each for their newspaper, radio and television stations. Requests for accreditation should be on school letterhead and signed by an appropriate faculty advisor or dean.

* Philatelic publications must meet the criteria of general publications or be national publications of recognized philatelic organizations. Representatives of catalogs, newsletters of local clubs or of profit seeking projects will not be accredited. Conducting philatelic business, other than reporting, will not in any way be tolerated.

* Representatives of photo studios without confirmed media assignments will not be accredited.

* Representatives of shopping center advertising circulars, local civic, social, political, or hobby newsletters will not be accredited.

* Provision for access to a press dependents' viewing site can be arranged at Kennedy. These are on a first-come, first-served basis and depend on availability of space. Transportation will not be provided.

* No one under 16 years old will be badged or allowed at the press site.

* Violation of the rules will result in the loss of press badges and press site privileges.

-end-

(Index: 25, 37)

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1/12/83

FOR RELEASE: IMMEDIATELY
PHOTO NO

NASA DRYDEN FLIGHT RESEARCH FACILITY, Edwards, CA . . . HiMAT, a remotely piloted research aircraft flown from NASA's Dryden Flight Research Facility, made its last flight in the Highly Maneuverable Aircraft Technology Program Jan. 11, 1983 Tuesday. The pint-sized HiMAT attained the ability to make transonic turns nearly twice as tight as any current front line fighter aircraft during its flight testing at this NASA facility. The goal of the HiMAT Program is to research a wide variety of high performance aircraft technologies, providing data for development of U.S. fighter aircraft of the 1990's. Some of the technology areas flight tested by HiMAT included use of composites, aeroelastic tailoring, close coupled canards and winglets. To safely, rapidly and economically test these concepts, HiMAT was developed as a subscale remotely piloted research vehicle and was flown from a ground cockpit at Dryden after launch from a NASA B-52 aircraft. NASA Civilian Research Pilots for HiMAT were Bill Dana, Steve Ishmael and Einar Enevoldson. NASA Researchers will continue to study data gathered during the twenty-six HiMAT flight tests.

PHOTO CREDIT - NASA or National Aeronautics and Space Administration

January 12, 1983

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RELEASE NO: 83-1 FOR RELEASE: Immediate

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Dryden to Test Drop Parachutes for Shuttle Rocket Boosters

NASA will conduct six research flights dropping a mock Space Shuttle solid rocket booster from a B-52 airplane for the purpose of testing improvements to the booster parachute system.

The reusable solid rocket boosters augment the Shuttle's main engines during launch, providing the main thrust required in the first phase of flight to orbit. About two minutes after launch, the boosters are jettisoned. A multi-parachute system softens their fall to an ocean splash down, enabling them to be recovered and used for future launches.

The upcoming tests will use mock boosters, called Drop Test Vehicles, to evaluate the new and bigger parachute system. For each test, investigators at NASA's Dryden Flight Research Facility will mate a Drop Test Vehicle to the B-52. After all systems are thoroughly checked, the carrier plane will transport the Vehicle to nearby China Lake Naval Weapons Center and drop it over a special test range. The parachutes will deploy at a designated speed and altitude, testing their performance and load-carrying capability.

In present Shuttle operations, a booster's standard parachute system consists of a small pilot parachute, a medium sized drogue parachute, and three main parachutes, 115 feet in diameter. The new system will use main parachutes which are 136 feet in diameter.

In order to simulate an actual mission booster drop during these tests, the mock-up system will use just one of the bigger main chutes. This is because the Drop Test Vehicle weighs about one-third of a full-size booster.

The drop tests have two purposes. Three of the drops will check out the new main parachute. The larger chutes are designed to lessen a booster's impact and resulting damage at splashdown.

- more -

Parachute Drop Tests, cont...

The other three drops will test a new drogue parachute. The new drogue will become important during future polar-orbit launches, which will not have the assistance of earth's rotational speed. Designers are changing the drogue to support an advanced, lightweight booster, to be introduced in future missions. Using the lighter booster will help the Shuttle carry heavier payloads and increase its boost capability.

The light booster has a filament wound composite case in place of the current steel case, saving about 30,000 pounds per booster. Increased reentry speeds and altitudes which the new boosters will encounter will put more stress on the drogue parachutes when they deploy. The new drogue is designed to withstand those conditions.

Investigators will collect data during the tests by film and avionics recordings. Immediately following a drop, they will recover the Test Vehicle -- to be refurbished and used in other tests -- and all data records for examination.

NASA Dryden, a facility of NASA's Ames Research Center, is conducting the drop tests in cooperation with NASA's Marshall Space Flight Center, which is responsible for the parachute system. Project managers expect to conduct the first drop in mid-February.

- NASA Dryden -

4 February 1983

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RELEASE NO: 83-2 FOR RELEASE: Immediate

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NASA-British Experiment Expands Limits of Computerized Flight

NASA's Dryden Flight Research Facility and the British Royal Aircraft Establishment (RAE) have finished the first phase of their joint Cooperative Advanced Digital Research Experiment -- called CADRE -- and are now ready to embark on phase two. CADRE is using NASA's F-8 Digital Fly-By-Wire airplane as a testbed to push computerized flight controls far beyond their present boundaries.

The CADRE program weds a sophistocated British-developed non-linear computer technique with the NASA-developed F-8 digital computer-controlled research aircraft. NASA Dryden, a facility of NASA's Ames Research Center, originally constructed the F-8 Fly-By-Wire to test computerized flight systems for the Space Shuttle and other advanced high performance aircraft. These systems are required to help pilots operate today's high performance airplanes.

NASA's F-8 is equipped with three redundant digital computers linked electronically to the plane's control surfaces and pilot's steering stick. These electronic linkages replace standard mechanical hookups between pilot's stick and flight surfaces in traditional airplanes. Computers take over basic functions of operating the aircraft's systems, freeing the pilot to make essential command decisions.

One advantage of digital fly-by-wire is that software designers can change or adapt the aircraft system according to pilot needs. Gains act within a system to augment a user's input. In fly-by-wire aircraft, increasing gain also magnified undesirable noise in the system; so increasing it beyond a certain point became a problem. The CADRE project came about because pilots needed both a high gain system for fast acquisition and lower gain for fine tracking. CADRE control laws advanced the digital fly-by-wire system, enabling it to meet both requirements.

The control concept was developed initially by the RAE. The

- more -

NASA-British Experiment, cont...

British had proposed several novel non-linear adaptive control concepts offering potential benefits in both performance and handling qualities. One of these concepts, the Variable Control to Optimize Response (VICTOR) is the basis of CADRE. The British theorized that engineers could use a gain which varies, and mathematically tailor it to adapt favorably to the pilot's demand. In VICTOR, the system senses any error between what the pilot puts in and what is happening to the aircraft and adapts the gain based on this error. British engineers developed a set of control laws using a small computer simulation of the F-8. With the CADRE program, NASA experimenters refined those control laws using an F-8 ground flight simulator.

Flight testing variable gain laws could be hazardous if experimental components were installed on board the aircraft. Variable gain theory is expanding state-of-the-art technology; and experimenters often don't know how the aircraft will respond. So NASA researchers contributed a supremely useful technique called RAV, for Remotely Augmented Vehicle.

RAV enables the onboard pilot to control his plane through a ground-based computer, bypassing the plane's own onboard computers. His stick movements downlink telemetrically to the ground computer; which responds by uplinking commands to the aircraft's surfaces and onboard equipment. By using RAV, researchers avoid long and costly safety validation procedures required for onboard software. If the test plane's responses go beyond specified limits, the system automatically disengages the ground computer; and the plane reverts to using its own safety-verified computer controls. RAV has the added benefit of letting researchers use efficient FORTRAN programming -- not possible with the F-8's onboard computers.

On completing CADRE's first phase, researchers confirm that variable gain is a workable technology. Their early concerns that pilots would have problems adjusting to constantly changing gain proved unfounded. None of the program's four test pilots could tell that the gain was changing at all. All of the pilots found handling qualities improved over the standard F-8 fly-by-wire system when they used CADRE control laws. According to NASA program manager Dr. James Stewart, the concept now is ready for adaptation to operational aircraft.

Stewart says that both British and NASA participants are extremely pleased with the results of CADRE's first phase. The program's second phase is devoted to developing a filter with time response variations as a function of the amount of a pilot's demands on the control stick.

- NASA Dryden -

11 February 1983

NASA News
National Aeronautics and
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RELEASE NO: 83-5 FOR RELEASE: IMMEDIATE

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NASA FLIGHT TESTS SHUTTLE BLANKET

The National Aeronautics and Space Administration is flight testing a quilt-like insulation material that covers portions of the Space Shuttle Challenger in conditions that simulate the wear and tear it will go through in actual Space Shuttle missions. The tests are a part of the Advanced Flexible Heat Shield Flight Tests aimed at providing data for development of insulation materials for future air and spacecraft.

Flown aboard a NASA Dryden F-104 research aircraft, the insulation, called Advanced Flexible Reusable Surface Insulation, or AFRSI, is a new material that uses several forms of silica fabricated in sheets about three feet square. Adhesively bonded to the aluminum skin of the Orbiter, AFRSI protects it from the extreme heat experienced in re-entering the Earth's atmosphere in much the same way as the tiles found on other portions of the orbiter. Because it is lighter, cheaper and easier to apply, the

-more-

AFRSI will eventually replace most of the white tiles used on Columbia, as well as some of its Nomex felt (FRSI). On Challenger, the AFRSI will be used on the Orbital Manuevering System pods, while on the Orbiters Discovery and Atlantis it replaces FRSI and most white tiles.

While extensive high-temperature wind tunnel tests of the AFRSI at NASA's Ames Research Center have proven its ability to withstand the rigors of shuttle missions, researchers want to gather data on the material in actual flight conditions to provide a data base for the development of future insulation materials. These future materials are expected to add even greater capabilities to present space shuttles, advanced space vehicles and hypersonic aircraft.

The F-104 Baseline AFRSI phase of this flight series tests a variety of different configurations ranging from the coated Nomex material used on Columbia, through the half-inch and one-inch thick AFRSI. For these tests, the material is mounted on a frame which is then fitted to a specially instrumented flight test fixture mounted beneath the belly of the F-104.

Flying a flight profile, precisely maintained with the help of ground based computers, the NASA civilian research pilot subjects the AFRSI to air loads that are equivalent to those that are experienced in actual Space Shuttle flights. In addition the materials are then tested under aerodynamic loads that are up to 1.4 times as severe as those experienced in Shuttle flights, or around 1,100 lbs per square foot. Speeds during these flights range from about 500 mph at 3,000 ft altitude to 1,000 mph at altitudes up to 34,000 ft. During the flights, test data are carefully monitored and recorded in the NASA Dryden control room and data gathering facilities.

Variations in the materials tested in the baseline AFRSI flight test program include insulation fabricated using heavy and light surface fabric, felt layers of differing thicknesses and varying joint configurations. Some of these materials were thermally cycled in the Dryden Flight Loads Laboratory. Thermal cycling, or the precisely programmed heating and cooling of the insulation material helps researchers simulate the effects of several space shuttle missions and the resulting wear and tear.

Principle Investigators for the Baseline AFRSI Flight Test Program are Paul M. Sawko of NASA's Ames Research Center, Mountain View, California and Robert R. Myer of Ames' Dryden

-more-

facility while Roy Bryant acted as Project Manager for the Dryden flights. Howard Goldstein, who directs the Thermal Protection Materials Research Program at Ames, has described the flight test program as outstandingly successful so far. "In fact, we've encountered no failures at all in the flight tests we've done to date," said Goldstein. He also commented that the project, carried out using the resources of both Ames Research Center locations under their recent consolidation, has been very effective and well coordinated.

Subsequent phases of the Advance Flexible Heat Shield Flight Test Program will investigate the drag characteristics of the insulation materials, new material concepts and more severe thermal and aerodynamic environments.

-NASA Dryden-

February 22, 1983

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RELEASE NO: 83-9 FOR RELEASE: IMMEDIATE

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CHALLENGER DEPARTS NASA DRYDEN FOR KENNEDY SPACE CENTER

Mounted atop a 747 jumbo jet specially modified to serve as a space shuttle carrier, the Nation's second Space Transportation System orbiter, Challenger, departed NASA's Dryden Flight Research Facility at dawn today on its journey to Kennedy Space Center, Florida.

Escorting the Challenger/747 out of California was NASA Dryden Research Pilot John A Manke, flying a NASA F-104 chase aircraft. He reported that the two looked "peachey keen." The ferry flight was preceded by a NASA Gulfstream weather pathfinder aircraft which flew approximately 30 minutes ahead of Challenger.

First stop scheduled for the behemoth combination of space ship and transport was at Kelly AFB, San Antonio, Texas, where it arrived at 11:45 a.m. CST.

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Due to a major storm moving toward Kennedy Space Center, shuttle managers have decided that Challenger will remain overnight at Kelly. They will take off for Florida as soon as the weather clears tomorrow and may arrive at the Space Center as early as 12:00 noon EST.

The first leg NASA flight crew boarded the 747 at about 5:15 a.m. PST in preparation for the departure. The Edwards to Kelly AFB crew consisted of NASA Dryden Research Pilot Fitzhugh, "Fitz" Fulton who flew as aircraft commander and Johnson Space Center Pilot A.J. Roy served as co-pilot. Flight Engineers for the three and a half hour first leg were Dryden Flight Test Engineer Ray Young and Johnson Flight Engineer Vincent Alvarez.

The Western half of the ferry flight took Challenger near such cities as Twenty-nine Palms, Calif,; Phoenix and Tucson, Ariz,; and El Paso and Ft. Stockton, Texas. The Challenger/747 was scheduled to make a refueling stop and crew change at Kelly AFB.

Challenger is usually visible to those watching on the ground as the two craft fly at altitudes of from 10 to 15 thousand ft.

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CHALLENGER DEPARTS NASA DRYDEN FOR KENNEDY SPACE CENTER

continued...

Friday, the second leg flight crew is scheduled to fly the Challenger on to Kennedy Space Center, Florida. Aircraft commander for this segment is Johnson Space Center Pilot, Joe Algrante, Astronaut Francis R. "Dick" Scobee, co-pilot; with Louis "Skip" Guidry and Glen O. Pingry in the flight engineer positions.

Because of weather considerations, the flight segment to Kennedy Space Center may dip southward over the Gulf of Mexico.

Upon reaching Kennedy Space Center, the Challenger will be demated from its 747 carrier aircraft and towed to the Orbiter Processing Facility for refurbishment in preparation for the STS-7 mission now scheduled for early June.

-NASA Dryden-

April 14, 1983

NASA News

National Aeronautics and
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RELEASE NO: 83-11 FOR RELEASE: 13 May 1983

Sharon Wanglin
(805) 258-8381
(also being released from
NASA Headquarters)

NASA's B-57 Will Flight Check Tornadoes

NASA researchers are flying their air turbulence-instrumented B-57 airplane to Oklahoma in mid-May, to study the wind dynamics peculiar to tornadoes.

Fitz Fulton of NASA's Dryden Flight Research Facility and chief pilot on the project plans to fly the plane as close to the funnel clouds as can safely be done. The project begins May 16, and continues for three weeks.

"Tornadoes generally move from 20 to 30 miles per hour," says Fulton. "It's felt that you can fly as close as a half-mile with safety."

Fulton has a good deal of experience collecting flight data on storms. Last summer, he flew the B-57 in thunder storms around

- more -

Denver, extending our understanding of wind shear peculiar to the sort of storm which develops around the Rocky Mountains.

NASA is conducting this spring's tornado study jointly with the National Oceanic and Atmospheric Administration's National Severe Storms Laboratory in Norman, Oklahoma. While the B-57 checks out turbulence in the air, Storms Laboratory investigators will measure data on the ground. NASA also will rely on the Laboratory's radar to stay a safe distance from the tornadoes.

"They'll help keep us out of the hot spots," says NASA project manager Wen Painter. Most of the flying is done below 500 feet; and a tornado's suddenly-changing winds can top 60 miles per hour. "It keeps you on your toes," says Painter.

The project's main goal is to better our understanding of storm conditions and reduce loss of life and property, according to Fulton. A big part of NASA's aim is to provide information for the design of airplanes that can take stresses and loads encountered in such storms. What we learn in the coming tornado flights will supply basic material for the needed designs.

- NASA Dryden -

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RELEASE NO: 83-15 FOR RELEASE: Immediate

Ralph B. Jackson
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MEMO TO EDITORS:

NASA Dryden has scheduled simulated night landing practice missions in preparation for the actual night landing of the Space Shuttle on STS-8. The practice mission will begin at 1:00 A.M. Saturday, July 23. News media wishing to observe these flights should contact the NASA Dryden Public Affairs Office, (805) 258-8381 prior to close of business, Thursday, July 21.

-dfrf-

July 18, 1983

NASA News
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X not used in
Aug. either

RELEASE NO: 83-21 FOR RELEASE: IMMEDIATE

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NASA TESTS NEW SHUTTLE BOOSTER PARACHUTE SYSTEM

The National Aeronautics and Space Administration has started testing new and larger Space Shuttle solid rocket booster parachute systems at the China Lake Naval Weapons Center, located near Ridgecrest, California. Using a mock booster called a Drop Test Vehicle deployed from a NASA Dryden Flight Research Facility B-52 carrier aircraft, the space agency plans to carry out six research drops to test a new 136 ft diameter main parachute system and a new drogue parachute.

Friday's test, the first in the current series, appeared successful according to NASA officials. The 24-ton mock booster, was released at about 20,000 ft altitude at around 345 miles per hour in clear skies above the Mojave Desert. Deployment of the parachute system began approximately 10 seconds after release from the B-52 research aircraft.

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In present space shuttle operations, the shuttle's two solid rocket booster engines are jettisoned about two minutes after launch. A multiple parachute system allows them to be recovered at sea and used for future launches. Currently, the main parachutes are 115 ft. in diameter and the new larger chutes are expected to lessen a booster's impact at splashdown. Each booster parachute system consists of a small pilot parachute, a medium size drogue parachute and three main parachutes. For drop test purposes, the mock-up system uses only one main chute with a drop test vehicle that is one-third the weight of a real booster.

Later drop tests will study a new drogue chute important during future polar orbit missions. Polar orbit missions, to be launched from Vandenberg AFB, California, will not have the assistance of the earth's rotational speed. Designers are changing the drogue, a chute that helps decelerate and stabilize the booster, to support an advanced lightweight booster, to be introduced for these missions.

Dryden, a facility of NASA's Ames Research Center, is conducting the drop tests in cooperation with NASA's Marshall Space Flight Center, which is responsible for the parachute system.

-NASA Dryden-

September 16, 1983

NASA News

National Aeronautics and
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11/4/83

RELEASE NO. 83-24 FOR RELEASE: Immediate

Les Reinertson
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CHAMBERS OF COMMERCE TO ISSUE SHUTTLE VIEWING PASSES FOR NASA

The National Aeronautics and Space Administration's Ames-Dryden Facility will provide car passes to view the landing of the STS-9 Space Shuttle Columbia to over 100 California Chambers for distribution to the public in their areas. The car passes will be issued on a first-come, first-served basis, and are now available at the participating chambers.

The landing, expected to take place December 7, 1983, marks the Orbiter Columbia's sixth return from space and 40,000 car passes will be distributed so the public may view it. No entry to the shuttle viewing site will be allowed without the special car pass.

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Each pass admits the occupants of one vehicle to the viewing site situated on the East Shore of Rogers Dry Lake on Edwards Air Force Base. The pass is valid for any type of vehicle and its occupants. The car pass will provide directions for entry onto the facility.

Chambers of Commerce distributing the Space Shuttle landing car passes include:

Agoura Chamber of Commerce

Alhambra Chamber of Commerce

Anaheim Chamber of Commerce

Apple Valley Chamber of Commerce

Arcadia Chamber of Commerce

Azusa Chamber of Commerce

Greater Bakersfield Chamber of Commerce

Baldwin Park Chamber of Commerce

Barstow Chamber of Commerce

Bell Gardens Chamber of Commerce

Bellflower Chamber of Commerce

Beverly Hills Chamber of Commerce

Brea Chamber of Commerce

Bishop Chamber of Commerce

Burbank Chamber of Commerce

California City Chamber of Commerce

Camarillo Chamber of Commerce

Canoga Park Chamber of Commerce

Canyon Country Chamber of Commerce

Century City Chamber of Commerce

Chatsworth Chamber of Commerce

Greater Chico Chamber of Commerce

City of Industry Chamber of Commerce

Compton Chamber of Commerce

Concord Chamber of Commerce

Conejo Valley Chamber of Commerce

Crescenta Valley Chamber of Commerce

Culver City Chamber of Commerce

Downey Chamber of Commerce

Eagle Rock Chamber of Commerce

El Monte Area Chamber of Commerce

Fontana Chamber of Commerce

Fresno County Chamber of Commerce

Gardena Chamber of Commerce

Glendale Chamber of Commerce

Goleta Valley Chamber of Commerce

Granada Hills Chamber of Commerce

Grover City Chamber of Commerce

Hawthorne Chamber of Commerce

Hesperia Chamber of Commerce

Hollywood Chamber of Commerce

Huntington Beach Chamber of Commerce

(more)

Huntington Park Chamber of Commerce

Joshua Tree Chamber of Commerce

Kern County Board of Trade

Imperial Chamber of Commerce

Ingelwood Chamber of Commerce

La Canada/Flintridge Chamber of Commerce

Laguna Beach Chamber of Commerce

La Habra Chamber of Commerce

Lancaster Chamber of Commerce

La Verne Chamber of Commerce

Lompoc Valley Chamber of Commerce

Long Beach Area Chamber of Commerce

Long Beach Jr. Chamber of Commerce

Los Angeles Area Chamber of Commerce

Los Angeles Visitor Center

Merced County Chamber of Commerce

Merced City Chamber of Commerce

Mojave Chamber of Commerce

Monterey Park Chamber of Commerce

North Hollywood Chamber of Commerce

Northridge Chamber of Commerce

Oakland Chamber of Commerce

Oxnard Chamber of Commerce

Palmdale Chamber of Commerce

Palm Springs Chamber of Commerce

Palos Verdes Chamber of Commerce

(more)

Pasadena Chamber of Commerce

Pico Rivera Chamber of Commerce

Pomona Chamber of Commerce

Port Hueneme Chamber of Commerce

Poway Chamber of Commerce

Rancho Cucamonga Chamber of Commerce

Redlands Chamber of Commerce

Redondo Beach Chamber of Commerce

Redwood City-San Mateo Chamber of Commerce

Reseda Chamber of Commerce

Ridgecrest Chamber of Commerce

Greater Riverside Chamber of Commerce

Rosamond Chamber of Commerce

Sacramento Chamber of Commerce

Saddleback Regional Chamber of Commerce

Salinas Chamber of Commerce

San Bernardino Area Chamber of Commerce

San Clemente Chamber of Commerce

San Diego Chamber of Commerce

San Dimas Chamber of Commerce

San Francisco Chamber of Commerce

San Jose Chamber of Commerce

San Luis Obispo Chamber of Commerce

San Pedro Chamber of Commerce

Santa Ana Chamber of Commerce

Santa Barbara Chamber of Commerce

(more)

Sherman Oaks Chamber of Commerce

Simi Valley Chamber of Commerce

Southgate Chamber of Commerce

Greater Stockton Chamber of Commerce

Studio City Chamber of Commerce

Temple City Chamber of Commerce

Trinity County Chamber of Commerce

Tulare Chamber of Commerce

Van Nuys Chamber of Commerce

Greater Ventura Chamber of Commerce

Vernon Chamber of Commerce

Victorville Chamber of Commerce

Walnut Chamber of Commerce

West Covina Chamber of Commerce

Western Los Angeles Regional Chamber of Commerce

Whittier Area Chamber of Commerce

Woodlake Valley Chamber of Commerce

Yorba Linda Chamber of Commerce

Yucca Valley Chamber of Commerce

(NASA Ames-Dryden)

November 4, 1983

NASA News
National Aeronautics and
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Ralph Jackson
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RELEASE NO 84-1 IMMEDIATE

MEMO TO EDITORS/NEWS DIRECTORS:

Shuttle flight 41-B (STS-11) is planned to land at NASA Kennedy Space Center in Florida. NASA Ames Dryden is the prime abort once around and the secondary landing site. Landing opportunities here are generally in the early morning prior to sunrise.

In the unexpected event 41-B should land here, the NASA Ames Dryden News Center will open to support the landing. However, it will not be able to cover normal flight activities from here.

The requirement for a vehicle pass to Edwards Air Force Base will be strictly enforced if a landing should occur here. Therefore, if you wish to obtain both a vehicle and personnel passes, it will be necessary for you to request them in sufficient time that they can be mailed to you in advance.

Facilities and personnel are not available to honor late requests.

January 13,1984

NASA News
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RELEASE NO: 84-2 FOR RELEASE: IMMEDIATE

Nancy Lovato
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SHUTTLE VIEWING ACCOMMODATIONS NOT AVAILABLE FOR SHUTTLE ALTERNATE LANDING SITE

Shuttle flight 41-B (STS-11), the eight-day space shuttle mission scheduled for launch Friday, February 3, 1984, is planned to be the first Orbiter space flight to land at NASA's Kennedy Space Center in Florida. In the event poor weather conditions prevail in Florida, the Orbiter Challenger could land at Edwards Air Force Base. Officials note that since no landing is scheduled for Edwards, no preparations for public viewing have been made and accommodations for shuttle viewers are not available.

Since a planned landing is not scheduled for Edwards, no vehicle passes are being distributed for the 41-B mission and none will be available from Chambers of Commerce that have customarily distributed them.

At this time, there are no scheduled shuttle landings at Edwards until mid-August.

NASA Ames Dryden

January 16, 1984

NASA News

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FOR RELEASE: IMMEDIATE

RELEASE NO. 84-4

ORBITER COLUMBIA TO UNDERGO MODIFICATIONS IN CALIFORNIA

The Space Shuttle Orbiter Columbia will be returned to the final assembly facility at Palmdale, California, about January 26 for necessary modifications prior to its next flight.

The original flight vehicle in the Space Shuttle program, Columbia has flown six times and will require mission peculiar modifications and some equipment replacements in order to support its next assigned mission, flight 41-G, scheduled for August 1984.

The Palmdale facility was selected for the changes because the work flow at the site lends itself to a timely modification of the vehicle prior to the August flight.

Columbia is now in the Orbiter Processing Facility at the Kennedy Space Center. Postflight servicing and the removal of the Spacelab module and tunnel has been completed. Columbia will be mated to the 747 Shuttle Carrier Aircraft and ferried to the Ames Dryden Flight Research Facility at Edwards Air Force Base, California. There it will be demated and transported overland to Palmdale.

Orbiters Challenger and Discovery are now at the Kennedy Space Center. Challenger is on Launch Pad 39-A in preparation for the next launch scheduled for February 3. Challenger is scheduled for five missions and Discovery for four missions in calendar year 1984.

-end-

January 23, 1984

NOTE TO EDITORS: Media wishing to photograph the overland move should plan on doing so in the town of Lancaster on 10th Street East between Avenue E and Avenue M. For the exact time and date of the move, contact the NASA Ames Dryden Public Affairs Office at (805)258-8381.

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RELEASE NO: 84-6 FOR RELEASE: IMMEDIATE

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Les Reinertson
Ames Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

NASA TO TEST INFLIGHT REFUELING FOR SPACE SHUTTLE FERRY FLIGHTS

The National Aeronautics and Space Administration is scheduled to begin flight tests to determine the feasibility of inflight refueling for Space Shuttle ferry flights using the 747 Shuttle Carrier Aircraft. The initial series of flight tests is slated to begin January 30,1984, from NASA's Ames Dryden Flight Research Facility at Edwards, California.

The 747 Shuttle Carrier Aircraft is used to transport Space Shuttle orbiters from remote landing sites back to the launch site at the NASA Kennedy Space Center in Florida. Should the landing occur at an overseas location, inflight refueling capability could increase the range of the SCA/orbiter without off-loading equipment or payloads.

There are nine flights presently scheduled for the refueling tests. The first three test flights will be made with the 747 Shuttle Carrier Aircraft without the orbiter, using a KC-135 tanker for two flights and a KC-10 tanker for one flight. An additional six flights will be made carrying the orbiter Enterprise and using the two types of tankers. Each flight will be of approximately two and one-half hours duration at speeds and altitudes expected to be used during actual ferry missions.

Both the Enterprise and its 747 carrier are specially instrumented to evaluate structual effects encountered during the tests. Enterprise is equipped with 31 pressure sensors and nine accelerometers. Two jet exhaust sensors are located in the

-more-

orbiter's payload bay to monitor any possible payload bay contamination from tanker engine exhaust. Other minor modifications to the SCA include marking the position of the refueling receptacle on the nose of the aircraft and tufting the nose, top, and sides of the forward fuselage.

Enterprise will also carry Thermal Protection System tile samples, as well as Flexible and Advanced Flexible Reusable Surface Insulation (special silica fabric insulations) specimens for evaluation. To simulate the weight of an operational orbiter, ballast will be placed onboard the Enterprise to increase its weight to a representative ferry weight of 182,000 pounds.

In addition to investigating the structual effects of inflight refueling on the orbiter and Shuttle Carrier Aircraft, the handling qualities and performance of the 747/orbiter and tanker aircraft will be evaluated, along with tanker and boom handling qualities. The tanker aircraft will be flown in light, medium, and heavyweight conditions and at various center of gravity configurations.

Flying the 747 Shuttle Carrier Aircraft for the inflight refueling tests will be NASA Ames Dryden Research Pilots Fitzhugh L. Fulton, Jr., and Thomas C. McMurtry, Astronaut C. Gordon Fullerton, and Johnson Space Center Pilot A.J. Roy.

-NASA-

NASA News

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For Release
(IMMEDIATE)

Les Reinertson
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RELEASE NO: 84-9

NASA RSRA TO BEGIN FLIGHT TEST IN NEW CONFIGURATION

Flight testing of a NASA/Army Rotor System Research Aircraft (RSRA) in its fixed-wing configuration is scheduled to start in late March at the Ames Dryden Flight Research Facility, Edwards, Calif.

Purpose of the tests is to demonstrate the fixed-wing capability of this helicopter/airplane hybrid research vehicle and explore its flight envelope and flying qualities in preparation for the NASA/DARPA RSRA/X-Wing Rotor flight test program.

The two NASA/Army RSRA are unique research vehicles, designed to provide a facility for inflight investigation and verification of new helicopter rotor system concepts and supporting technology. The RSRA can be configured to fly as a helicopter, as a compound helicopter (with fixed wings and auxiliary jet engines), or as an airplane. This is the first time the RSRA will have flown in the airplane mode.

The fixed-wing flight evaluation will be conducted in two phases. In the first phase the RSRA will be equipped with its tail rotor, but no main rotor with test speeds limited to under 250 knots, while the planned second phase will be completely rotorless for higher speed flights. Flight testing will be carried out at altitudes up to 3,000 meters (10,000 feet).

Both phases will include taxi tests, investigation of takeoff and landing techniques, acoustics tests, envelope development and determination of control power(the effects control inputs have on aircraft and dynamic stability). Additionally, the first phase will investigate level flight performance with and without the main rotor hub.

-end-

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RELEASE NO. 84-11 FOR RELEASE: IMMEDIATE

Leslie R. Reinertson
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NEW NASA AMES RESEARCH CENTER DIRECTOR OF FLIGHT OPERATIONS, AMES DRYDEN SITE MANAGER NAMED

Martin A. Knutson has been named Director of Flight Operations and Ames Dryden Site Manager for the National Aeronautics and Space Administration's Ames Research Center. The announcement was made by the Ames Center Director, William F. Ballhaus, Jr. Knutson, formerly Chief of the NASA Center's Airborne Missions and Applications Division, replaces John A. Manke, who retired April 27, 1984.

As Director of Flight Operations, Knutson is responsible for the operation of over forty highly specialized research and support aircraft at Ames Research Center, Mountain View, California and at its Ames Dryden Flight Research Facility. He also is responsible for site management of the Mojave Desert-located facility which conducts NASA's high speed flight research and serves as one the the prime landing sites for space shuttle missions.

Ames Research Center conducts scientific research to develope new technology in the areas of flight dynamics, human factors and flight system simulation, rotorcraft and aircraft technology, airborne science and applications, infrared astronomical observation techniques, planetary and atmospheric probes, and space life science.

Knutson joined NASA in 1971 as the Ames Center's Manager of Airborne Instrumentation Research Project. He was instrumental in creating the project and in acquiring its U-2 aircraft. A pilot with over 6,500 hours of flight time, Knutson maintained his flying proficiency in U-2s and an ER-2 aircraft. He has flown the U-2 aircraft for over 28 years and is a member of the Society of Experimental Test Pilots.

-NASA Ames Dryden-

May 18, 1984

NASA News

National Aeronautics and
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84-14 FOR RELEASE: IMMEDIATE

Les Reinertson
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(simultaneously released in Washington, DC.)

NASA MATHEMATICIAN RECEIVES SPACE ACT AWARD FOR MAJOR COMPUTER GRAPHICS BREAKTHROUGH

A major computer graphics breakthrough that has been widely praised by users in industry, government and universities has earned a NASA mathematician the National Aeronautics and Space Administration's Space Act Award. Ames Dryden Flight Research Facility research mathematician David R. Hedgley, who developed a computer code that allows a wide variety of computers to portray three-dimensional opaque solid shapes with relative ease, received the award in ceremonies at the Southern California NASA facility.

Hedgley's computer code solves what computer graphics experts call the "hidden-line problem" in which the computer depicts both visible and hidden lines in perspective, showing an "X-ray" or transparent view of three dimensional opaque objects. Past solutions to the hidden-line problem have generally required inordinately long execution times and have had limited applications. The Hedgley solution is general, very fast and applicable even in complex three-dimensional scenes.

While aeronautical researchers at Ames Dryden Flight Research Facility are using the solution, called the "Hidden Line Computer Code", in aircraft experimentation, it is applicable to a wide variety of fields including automotive design, architecture, metallurgy and other fields. Chemists at Rowland Institute for Science, Cambridge, Massachussetts, have used the code to visually represent molecule shapes, including new combinations of chemical elements. Engineers at Lockheed-Georgia Company, makers of the world's largest military aircraft, use the code in propulsion, aerodymanics, structures and scientific computing. Lockheed estimates that they save about $1,000 dollars a week in reduced engineering manhours required to create and "debug" aerodynamic and structural computer models. Engineers of the Nebraska Public Power District use the code to generate drawings of substation site locations and to ensure the construction will blend well with the environment. They also use it in graphic portrayals of District power usage and for other applications.

Public interest in the Hedgley solutions has been record breaking according to COSMIC. COSMIC is the Computer Software Management and Information Center, a part of the University of Georgia that operates as an extension of NASA's Technology Utilization Program in distributing NASA

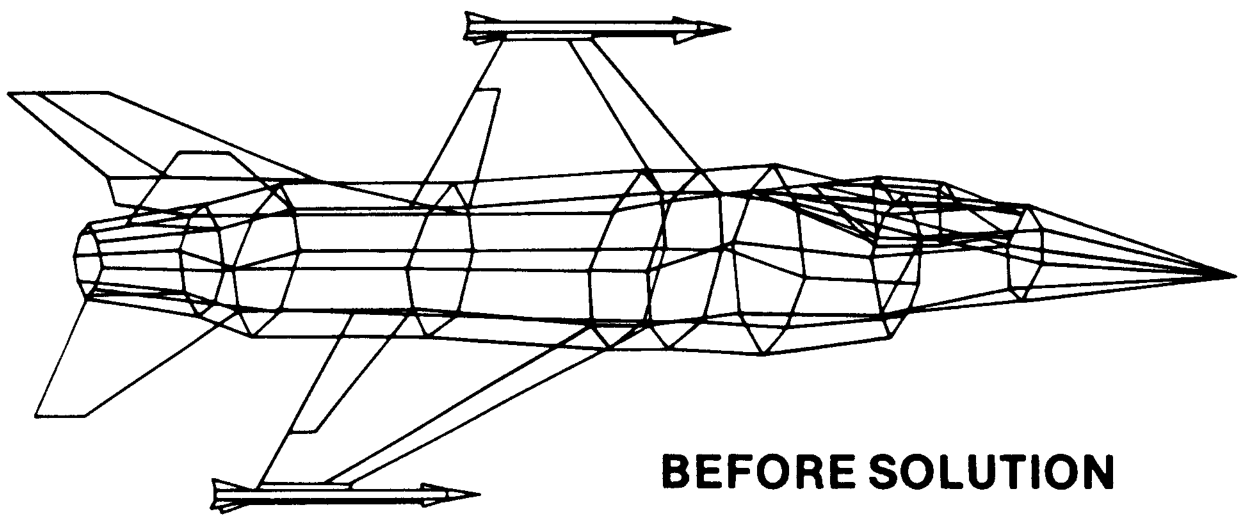
-more-

computer programs to other agencies and the private sector. The Hidden Line Computer Code has sold more copies in the first year of its release than any program has sold since COSMIC began in 1966. Reports from COSMIC clients using the solution have been very laudatory.

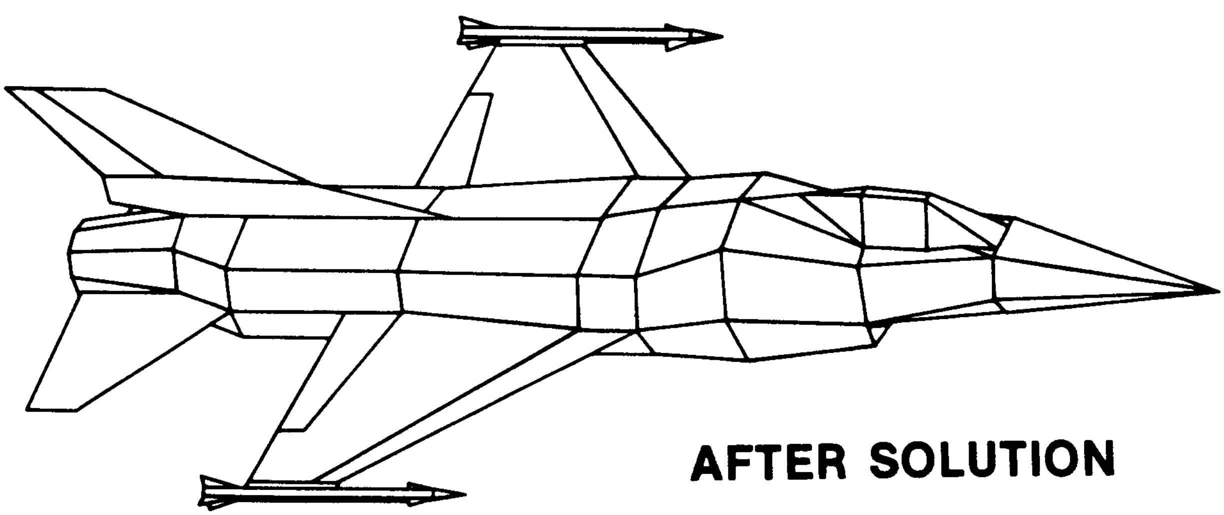
Hedgley's Space Act Award was accompanied with a remuneration of $7,500, the largest award ever granted to an Ames Dryden Flight Research Facilty employee in the history of NASA's Space Act Awards program.

Hedgley joined NASA in 1966 and holds a Masters Degree in Mathematics from the University of California at Northridge. He received a Bachelors Degree in Biology and Chemistry from the University of Virginia. Hedgley is a resident of Palmdale, California.

(Hedgley hidden line solution simple application illustrated below)



BEFORE SOLUTION



AFTER SOLUTION

-NASA Ames Dryden-

June 21, 1984

NASA News

National Aeronautics and
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AC 805 258-8381

RELEASE NO. 84-15 FOR RELEASE: IMMEDIATE

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AMES AIRCRAFT OPERATIONS CONSOLIDATED

All NASA Ames Research Center aircraft and their operation will be transferred to the Ames Flight Operations Directorate immediately, announced Ames Center Director William F. Ballhaus, Jr., on June 19, 1984. Martin A. Knutson, Director of Flight Operations and Site Manager of the Ames Dryden Flight Research Facility, will be responsible for all flight activities at Ames's Moffett Field location in northern California and at the Ames Dryden Facility in southern California.

The Flight Operations Directorate office will continue to be maintained at the Ames Dryden Facility.

One factor in the management change is continued safety of flight. Continuity of aircraft operations will be assured with all flight organizations reporting through a single management chain.

The change further serves to more fully integrate the Ames Dryden Facility into the day-to-day operations of the parent Ames Center. The Ames Research Center and the former Dryden Flight Research Center, now Ames Dryden, were consolidated in 1981, a move which enhanced the capabilities of both organizations.

Ames officials say that this is a continuing part of the overall Ames - Dryden consolidation and will centralize all flight operations activities in terms of operations procedures, safety, and management philosophy.

In this new role, Knutson will continue to be assisted by the present Deputy Director of Flight Operations and Deputy Ames Dryden Site Manager, Theodore G. Ayers.

A new position, that of Assistant Director of Flight Operations, is being added to Knutson's staff in order to provide on-site management representation at the Ames Moffett Field location. Occupying this position is Jerry M. Deerwester, who was formerly Assistant Chief of the Airborne Missions and Applications Division.

At the present time, there are no plans to move any aircraft or personnel involved from either location.

July 2, 1984

-end-

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RELEASE NO. 84-16 FOR RELEASE: IMMEDIATE

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NEW SOFTWARE SYSTEM FLOWN ON F-8

A new software concept that could reduce cost and hardware complexity in aircraft using digital flight control systems has been developed by NASA. The concept is called REBUS, for Resident Backup Software Technology, and was flown recently for the first time on an F-8 Digital Fly-By-Wire aircraft by NASA's Ames Dryden Flight Research Facility. This is the only known digital fly-by-wire system able to tolerate software errors without the use of an independent hardware system.

Some of the aircraft currently using digital flight control systems include the AFTI/F-16, the F/A-18 and the Space Shuttle. Digital fly-by-wire systems utilize onboard digital computers and electronics to replace mechanical linkage that normally translates pilot signals to the aircraft's control surfaces.

Current primary flight control system design employing digital computers utilizes at least a three-computer configuration. Although operational software is subjected to extensive verification and validation testing, some generic software errors may remain in the computer program. Since each of the computer channels has the same software program installed, an undetected generic error, should it occur, could result in the simultaneous loss of all digital aircraft control channels.

Because of this possibility, a separate and independent backup system is usually incorporated in current digital fly-by-wire control system designs. The backup system can be either an analog system or a separate digital computer with different operational software.

-more-

REBUS incorporates the backup software into the primary computers, thus eliminating the need for a separate computer and for a separate set of aircraft sensors. The backup software is of a different design than the operational software and is programmed by different computer programmers.

In the current series of flight tests, simulated failures in the operational software will be programmed into additional software, forcing the system into REBUS. This will enable the digital fly-by-wire system to retain command over all flight controls surfaces. If test results are as expected, they will build confidence in REBUS for future aircraft design.

Software design and implementation was conducted for Ames Dryden by Charles Stark Draper Laboratories.

-NASA Ames Dryden-

July 27, 1984

NASA News

National Aeronautics and
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RELEASE NO. 84-20 FOR RELEASE: IMMEDIATE

Nancy Lovato

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NASA INVESTIGATES ENGINE FAILURE DETECTION

The NASA Ames-Dryden Flight Research Facility has recently flown a series of tests to investigate the failure detection capability of the Digital Electronic Engine Control (DEEC) system on its F-15 aircraft.

Preliminary results have shown the DEEC system's ability to detect the failures and to continue operation using alternate control modes.

Utilizing an engine system not equipped with DEEC, detection of most engine problems are left to the pilot. A failure, such as an overtemperature, could result in an engine stall and engine shutdown, and possible engine damage.

The DEEC system detects any problem or failure and makes the correction automatically, thus significantly reducing the pilot's workload.

-more-

DEEC is an advanced computerized engine control system. The DEEC system has the capability to detect 160 different engine failures. For these tests, the DEEC system was operational on one of the F-15's two F100 engines.

During over three years of DEEC testing at Ames-Dryden, only a few of the 160 failures occurred. In order to more fully investigate the DEEC fault detection logic, switches and valves were installed in the key temperature and pressure sensors. Failures for these tests were then intentionally induced by activation of cockpit switches.

Flight results are being compared to ground tests and computer simulations. Based on early results, some changes are being considered to the DEEC system.

-NASA Ames-Dryden-

September 20, 1984

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RSRA HELICOPTER "AIRPLANE" FLIGHT TESTS COMPLETED AT NASA AMES-DRYDEN

Flight testing of the Rotor Systems Research Aircraft (RSRA) helicopter/airplane testbed in its fixed-wing mode has been completed at NASA's Ames-Dryden Flight Research Facility. The NASA/Army RSRA was returned to Ames-Moffett October 3, 1984, to flight test new helicopter rotor systems in a flight environment.

The purpose of the flight tests was to demonstrate the fixed-wing capability of the research helicopter/airplane hybrid and to expand its flight envelope in that configuration. The evaluation included taxi tests, acoustic tests, control power/stability tests and rotor hub drag investigation, as well as takeoff and landing technique investigation and envelope development.

A total of 13 flights expanded the RSRA's fixed-wing envelope capabilty to 262 knots (about 300 m.p.h.) and its altitude to 10,000 ft. Its' first fixed-wing flight occurred at Ames-Dryden on May 8, 1984 and the tests concluded September 19th.

-NASA-

October 5, 1984

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RELEASE NO. 84-25 FOR RELEASE: IMMEDIATE

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NASA RETIRES OLDEST AIRCRAFT, WELCOMES NEWEST

Late this month, NASA will retire its last C-47, the military version of the DC-3, at the NASA Ames-Dryden Flight Research Facility where preparations are currently underway for the first flight of the X-29, the newest of the X, for Experimental, aircraft series, many of which were flight tested at Ames-Dryden.

The C-47, oldest aircraft in the NASA fleet, will be flown to Fairchild Air Force Base, Washington, where it will go on static display. It was first acquired by NASA's Langley Research Center, Virginia, in January 1946 and was transferred to Ames-Dryden in 1978.

The all-metal, twin engine aircraft, designated a C-47D, was built in 1943. It has flown a total of 8,193.1 hours, 819.8 of which were in the service of Ames-Dryden during the course of 635 flights. Serial number of the aircraft is 43-49526.

-more-

The X-29 arrived at Ames-Dryden on October 11 from Grumman Aircraft Corporation's Long Island facility. It is being prepared for first flight in late November 1984.

The single engine X-29 features sharply angled forward swept wings, with close coupled canards for horizontal stability mounted in front of the wings. Lightweight fiber-reinforced composite materials were used for much of the structure, thereby reducing drag and increasing fuel efficiency. The X-29 uses a triple redundant digital fly-by-wire flight control system with an analog backup.

C-47's were utilized primarily as a support aircraft at Ames-Dryden, supporting such programs as the X-15. A C-47 played an important part in the first flights of NASA's lifting body, a forerunner of the Space Shuttle. The lightweight M2-F1 was towed aloft by a C-47 and released at 12,000 feet altitude to glide to a controlled landing. The M2-F1 made more than 90 flights.

The C-47 accomplished such tasks as dropping flares for simulated night landings of the Shuttle before permanent lights were installed. Another task, accomplished for the Jet Propulsion Laboratory, was early development work on equipment used in space to make measurements for geological surveys.

The flight to Fairchild AFB is expected to be approximately seven hours, with no stops.

-NASA AMES-DRYDEN-

October 25, 1984

NASA News
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RELEASE NO. 84-27 FOR RELEASE: IMMEDIATE

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NASA SEEKS PROPOSALS FOR F-8 OBLIQUE PRELIMINARY DESIGN

The National Aeronautics and Space Administration's Ames Research Center, Mountain View, California, has issued a Request for Proposal (RFP) for the preliminary design phase of a joint NASA/Navy program to design, construct and evaluate an oblique wing during supersonic flight research conditions. The feasibility study was completed in 1983.

The oblique wing concept allows an aircraft's straight wing to be rotated in flight to achieve either efficient low speed maneuverability and long loiter time -- or supersonic cruise flight.

This program is a follow on to the subsonic AD-1 first manned oblique wing aircraft flight research program conducted by NASA Ames-Dryden from late 1979 through 1982.

-more-

The RFP is for phase "B" of a four-phase procurement program for modifying the NASA F-8 Digital Fly-By-Wire research aircraft to a supersonic oblique wing configuration. This phase of the program will provide the preliminary design for the oblique wing, its pivot assembly, and a set of software flight control laws for use in the F-8's flight computers. It will also define the aircraft's flight performance and assess its operational capabilities for potential naval applications.

NASA officials expect that two or more contractors will be selected to perform the preliminary design work through the competitive procurement process.

Near the end of the preliminary design work, a second RFP, phase "C," will be issued in order to select a single contractor from the phase "B" participants for detailed design work. This phase will also include fabrication and ground testing and will be followed by the phase "D" flight support contract. An initial 12-month flight test program consisting of about 40 flights is planned, followed by additional flight research investigation.

The goal of the NASA/Navy program is to validate oblique wing technology in flight regimes that are representative of versatile operational aircraft. Specifically, this would include the successful design, fabrication, and flight test of a

-more-

composite, aeroelastically tailored oblique wing. Such a composite wing would be constructed in a manner so that the bending stresses of flight would not degrade the wing's aerodynamic efficiency. In addition, the program seeks to demonstrate the versatility and efficiency of the oblique wing for typical military and civilian applications, including Navy fleet operations, by exhibiting efficient supersonic cruise, subsonic loiter, and effective maneuvering.

Flight testing of the F-8 oblique wing aircraft will occur at NASA's Ames-Dryden Flight Research Facility, Edwards, California.

-NASA Ames-Dryden

November 21, 1984

NASA News
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RELEASE NO. 85-1 FOR RELEASE: IMMEDIATE

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NASA COMPLETES SHUTTLE BOOSTER PARACHUTE TESTS

The National Aeronautics and Space Administration has completed a series of tests on the Space Shuttle solid rocket booster parachute system. The tests were to validate parachute systems that are to be used on advanced lightweight solid rocket boosters that will replace the solid rocket boosters now in use.

The new boosters will be used on the first Space Shuttle launch from Vandenberg Air Force Base, now scheduled for no earlier than January 29, 1986.

Two reusable solid rocket boosters assist the Space Shuttle's main engines during launch by providing thrust required in the first phase of flight to orbit. The boosters are jettisoned about two minutes after launch and a multiple parachute system slows their descent to an ocean splashdown. The parachute system consists of a small pilot parachute, a medium size drogue parachute, and three main parachutes.

-more-

For the tests, a drop test vehicle one-third the size of a solid rocket booster was used with one main parachute to simulate an actual splashdown. However, "splashdown" took place over the dry California desert rather than an ocean.

The drop test vehicle was carried under the wing of NASA's Ames-Dryden Flight Research Facility's B-52, the launch aircraft that also carried the X-15 and lifting bodies that provide much information for the Space Shuttle program.

The vehicle was then released over the China Lake Naval Weapons Center test range at Ridgecrest, California. Most drops were made at an altitude of approximately 40,000 feet with an airspeed of about 230 knots.

NASA Ames-Dryden conducted the drop tests in cooperation with NASA's Marshall Space Flight Center, which is responsible for the parachute system.

-NASA Ames-Dryden-

March 20, 1985

NASA News
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RELEASE NO. 85-4 FOR RELEASE: IMMEDIATE

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NASA SELECTS APRIL 29 LAUNCH DATE FOR STS 51-B

NASA officials have selected 12:00 noon EDT, April 29, 1985, as the launch time and date for STS mission 51-B, the Spacelab 3 flight. Officials also selected NASA's Ames-Dryden Flight Research Facility, Edwards Air Force Base, California, as the primary end-of-mission landing site, with the Kennedy Space Center as an alternate. Landing is set for May 6 at 9:03 PDT.

The decision to choose Ames-Dryden over Kennedy was based on the recent landing experience following the STS 51-D mission where Discovery's right-hand braking systems locked up causing a tire to blow out during the landing. Landing conditions for this past mission included a crosswind - the first experience at Kennedy with such conditions - and a higher than usual sink-rate.

-more-

The decision to land at Ames-Dryden will provide more safety margin for the Challenger's tires and brake system because of the availability of the unrestricted lakebed and the smoother surface. The Spacelab 3 payload will be a heavy return weight for an orbiter. Until all the many factors affecting the landing conditions are better understood, management has elected to choose the Ames-Dryden facility for the next landing.

The decision to land at Ames-Dryden for the next flight only will enable engineers to determine what corrective actions are appropriate before returning to the Kennedy runway for nominal end-of-mission landings.

-NASA Ames-Dryden-

April 24, 1985

NASA News
National Aeronautics and
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RELEASE NO. 85-6 FOR RELEASE: IMMEDIATE

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NASA RESUMES AILERON-RUDDER INTERCONNECT PROGRAM

NASA's Ames-Dryden Flight Research Facility will resume flight tests on an F-14 aircraft to demonstrate enhancements to the Aileron-Rudder Interconnect flight control program in a joint NASA/U.S. Navy endeavor.

The Aileron-Rudder Interconnect, or ARI, is designed to coordinate turns, prevent wing rock, and resist spins at high angle of attack flight conditions. To equip the F-14 with ARI, modifications are made to the aircraft's basic analog flight control system.

While earlier configurations were successful in flight tests, a deficiency was noted in loss of roll power in high angle of attack flight regions. NASA developed a "cross control" feature in the ARI system to correct the problem.

-more-

The cross control feature allows the pilot to roll the aircraft opposite to lateral stick input, but in the direction of the rudder pedal input. This gives the F-14 pilot roll power needed for tactical maneuvering while the aircraft is in a high angle of attack mode.

The primary objective of the 21-flight test program will be to demonstrate that the cross control feature improves the F-14 high angle of attack roll capability in the ARI configuration.

Evaluation flights will be flown by NASA, Navy and Grumman pilots. In addition, Navy F-14 fleet pilots will make demonstration flights.

NASA is responsible for developing the ARI control laws. If the U.S. Navy should decide to incorporate ARI into the F-14 fleet, they and Grumman, the aircraft's manufacturer, would be responsible for the production design.

-NASA Ames-Dryden-

May 22, 1985

NASA News

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RELEASE NO. 85-8

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ALSO BEING RELEASED IN
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NASA BEGINS SIMULATED AIRLINE SERVICE FLIGHTS

The National Aeronautics and Space Administration will begin a series of simulated airline flights to operationally test new techniques designed to help smooth the air flow over aircraft wings.

Previous research has shown that smooth or laminar air flow can reduce aerodynamic drag from 25 to 40 percent under laboratory conditions and could provide significant fuel savings. However, in actual flight, laminar flow can be disrupted and disturbed by insects, ice, and other obstructions adhering to the leading edges of an aircraft's wings.

NASA's Ames-Dryden Flight Research Facility, Edwards, California, has installed on its business-sized JetStar aircraft two experimental laminar flow control devices incorporating techniques to help prevent leading edge contamination.

The simulated airline service flights will be flown in widely separated areas of the United States to experience a wide variety of contaminant conditions.

-more-

The JetStar will be based at various NASA installations and at commercial airports and will fly in and out of different airports to obtain information on various takeoff and landing situations that might affect the test articles. NASA will conduct the simulated airline service flights just as an airline would under normal air traffic rules and regulations.

While based at the different installations throughout the country, researchers plan up to four flights each day during a 2-week period to gather as much information as possible on performance of the test articles.

The two leading edge test articles, one installed on each wing of the JetStar, incorporate insect and ice protection with laminar flow control. Tests conducted on the JetStar in 1976 showed that the leading edge could be kept free of insects if it was kept wet while encountering them.

The test article installed on the left wing uses suction through 27 0.003-inch spanwise slots on the upper and lower surface to maintain laminar flow. A propylene glycol methyl ether (PGME)/water mixture is discharged through several slots at the wing leading edge and flows back over the wing for insect impact protection. This article was manufactured for NASA by Lockheed-Georgia.

The test article on the right wing uses suction through approximately 1 million 0.0025-inch diameter holes in the titanium skin to maintain laminar flow on the upper surface of

-more-

the article. For insect impact protection, a shield is extended much like a leading edge flap on commercial transports. The shield is retracted at 6,000 feet altitude. Spray nozzles behind the shield can be used to spray the PGME/water mixture on the test article for additional insect protection if necessary.

For ice prevention during winter conditions, glycol is forced through the right wing's porous metal section of the shield leading edge in addition to the PGME/water spray. This article was manufactured for NASA by McDonnell-Douglas.

Since the simulated airline service flights are planned to approximate commercial flights as closely as possible, NASA officials are meeting with commercial airlines to define what test conditions they would like to see flown and will incorporate the results of these discussions into flight planning. Researchers also are contacting entomologists in areas of the country that the JetStar will fly to determine the insect activity in each area.

The JetStar is configured as a "flying control room" with test instrumentation aboard. There are three consoles with data displays for researchers, who also have the ability to adjust the suction on the test articles if conditions warrant.

The JetStar will carry the Knollenberg probe, mounted atop the aircraft, to precisely measure the number and size of ice and water particles encountered in flight. A charge patch, located on the pylon that holds the probe, measures the static electric

-more-

charge caused by particles in the air rubbing across the patch surface and gives a qualitative measure of ice and water particles. Correlation of the probe and patch data could calibrate the charge measurement in a simple cockpit display. Pilots could use the display to detect ice particles.

The first series of operational flights is presently scheduled for mid-July. The JetStar will fly in and out of Hartsfield Airport, Atlanta, Georgia.

The program is a cooperative effort with NASA's Langley Research Center.

-NASA Ames-Dryden-

July 8, 1985

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NASA News

National Aeronautics and
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September 17, 1985

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RELEASE NO: 85-12

NASA TO FLIGHT TEST ADVANCED TECHNOLOGY WING

The first flight of the Advanced Fighter Technology Integration (AFTI) F-111 with a mission adaptive wing (MAW) is scheduled for late September at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif.

The AFTI F-111 research aircraft has been modified with a wing that can change its camber (fore and aft wing curvature) and its wing sweep to adjust to varied flight conditions.

The variable camber capability of MAW is expected to allow optimum efficiency at supersonic, transonic and subsonic speeds by adopting the best wing shape for each speed regime. The MAW program will demonstrate the use of smooth, variable camber technology for improved aircraft payload and range capability, better maneuverability, greater fuel efficiency, and improved aircraft handling qualities over current aircraft wing lift-altering devices.

The first flight begins the airworthiness and flight envelope expansion phase of the program which will be followed by the research phase. Current plans call for about 15 flights in the initial phase where the performance of the MAW aircraft will be gradually increased to speeds of approximately Mach 1.05 and altitudes of about 35,000 feet. This phase is expcted to be completed by January 1986. The research phase calls for about 30 flights to be concluded in June 1986.

-more-

The MAW system consists of smooth-surfaced, variable-camber wing leading- and trailing-edge flaps, actuation mechanisms, hydraulics and redundant computers to control flap positions. Six independent trailing-edge flaps (three per wing) and two leading-edge flaps provide a smooth, continuously-variable wing camber using flexible fiberglas skins on the upper surface and sliding panels on the lower surface.

The MAW computerized, camber-control system is a redundant electronic system that operates largely independent of the AFTI F-111 flight control system and uses two synchronized digital computers and two back-up analog computers.

Initially, the MAW system will be flown in the manual flight control system mode, providing preprogrammed flap positions which the pilot selects by push-button on a MAW cockpit panel. Aircraft roll control is provided through differential deflection of outboard and mid-span flaps which the pilot directs with stick movement.

Fully developed, the MAW system, would lead to an aircraft equipped with an automatic flight control system with several modes of control. Cruise Camber Control mode would optimize the trailing-edge flap position for maximum cruise speed. Maneuver Camber Control mode would continuously position leading- and trailing-edges for optimum lift-to-drag ratio depending on the lift coefficient and speed of the aircraft. Maneuver Enhancement/Gust Alleviation mode would enhance the aircraft response to pilot control imputs while at the same time reducing the aircraft's sensitivity to wind gusts.

The AFTI F-111 MAW is designed for research rather than to serve as a production prototype. The F-111 testbed was selected, in part, because its variable-sweep wing allows simulation of different types of military aircraft and it has the performance to fly as subsonic, transonic and supersonic speeds necessary to demonstrate the MAW system in various scenarios.

AFTI F-111 MAW is a joint program of the NASA Ames-Dryden Flight Research Facility and the U.S. Air Force's Flight Dynamics Laboratory. Additional support is provided by the Air Force Flight Test Center. The Boeing Military Airplane Company is the manufacturer of the MAW.

-NASA Ames-Dryden-

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RELEASE NO. 85-12A

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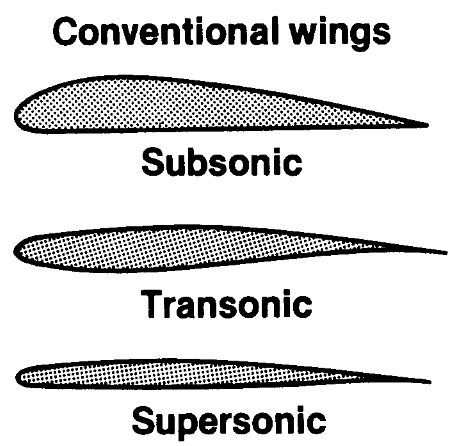
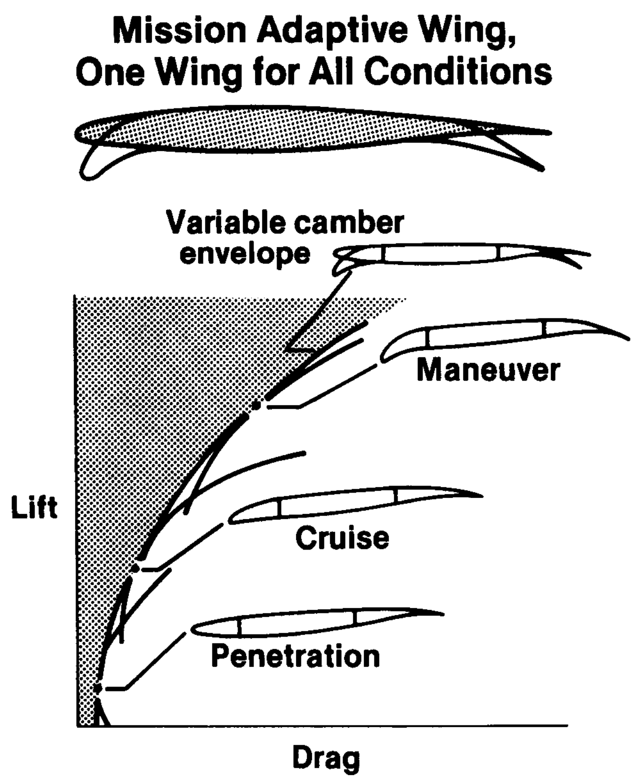
MISSION ADAPTIVE WING

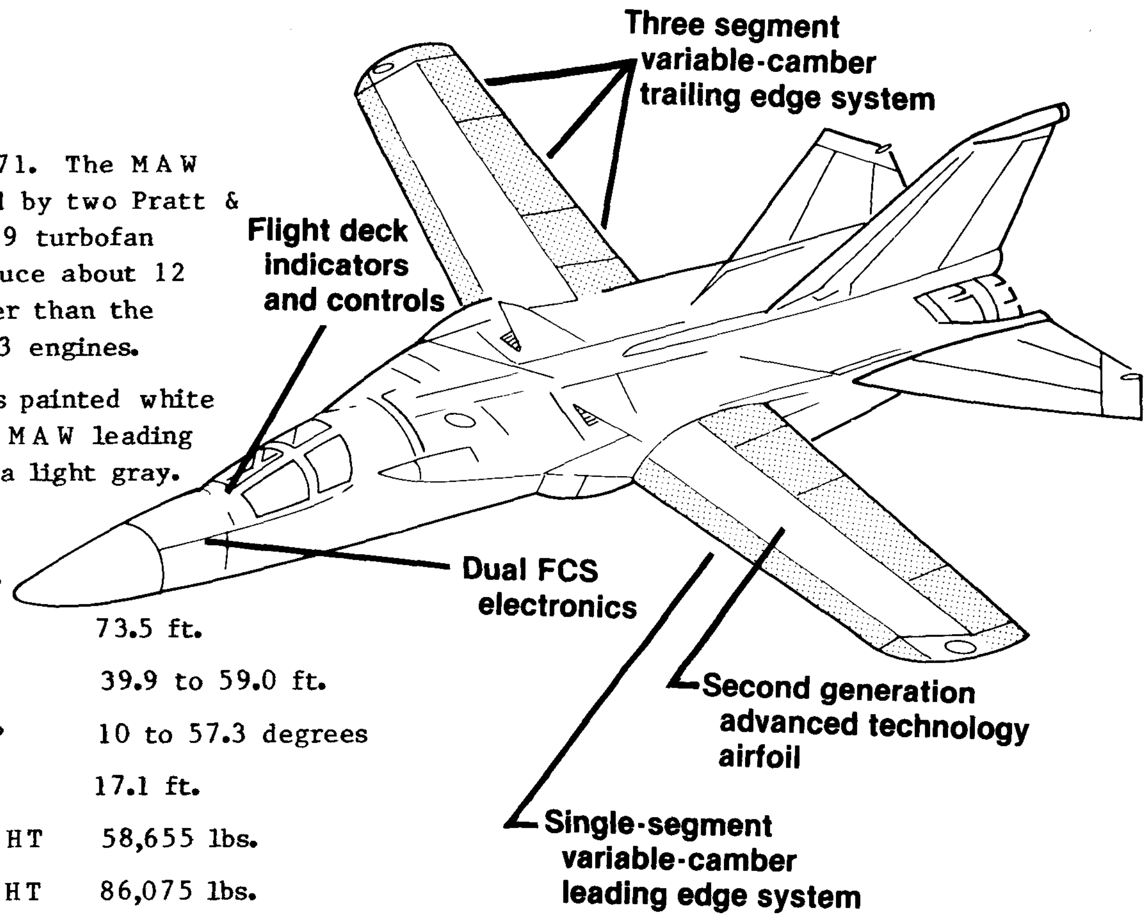




Expanding the flight regime of aircraft is a basic goal of flight research. The Mission Adaptive Wing (MAW), is a dramatic concept to demonstrate that future aircraft can fly expanded flight regimes by adapting their wings to the airfoil shape best suited for particular speeds, altitudes and maneuvers. The Mission Adaptive Wing development, part of the Advanced Fighter Technology Integration (AFTI) program, will provide a data base for designers of adaptive wing systems of the future.

An integral part of variable camber (wing fore and aft cross sectional curvature) on the Mission Adaptive Wing is its smooth flexible surface, accomplished by means of fiberglass skins covering the junctions of the leading and trailing edges with the wing box, as well as with close-fitting sliding undersurfaces. The smooth surface does away with drag producing conventional flaps, slats and spoilers.

The testbed aircraft for the Mission Adaptive Wing is the NF-111 (a pre-production aircraft, No. 13) which has been used by NASA for several research



programs since 1971. The MAW aircraft is powered by two Pratt & Whitney TF30-P-9 turbofan engines which produce about 12 percent more power than the original TF30-P-3 engines.

The aircraft is painted white for visibility with MAW leading and trailing edges a light gray.

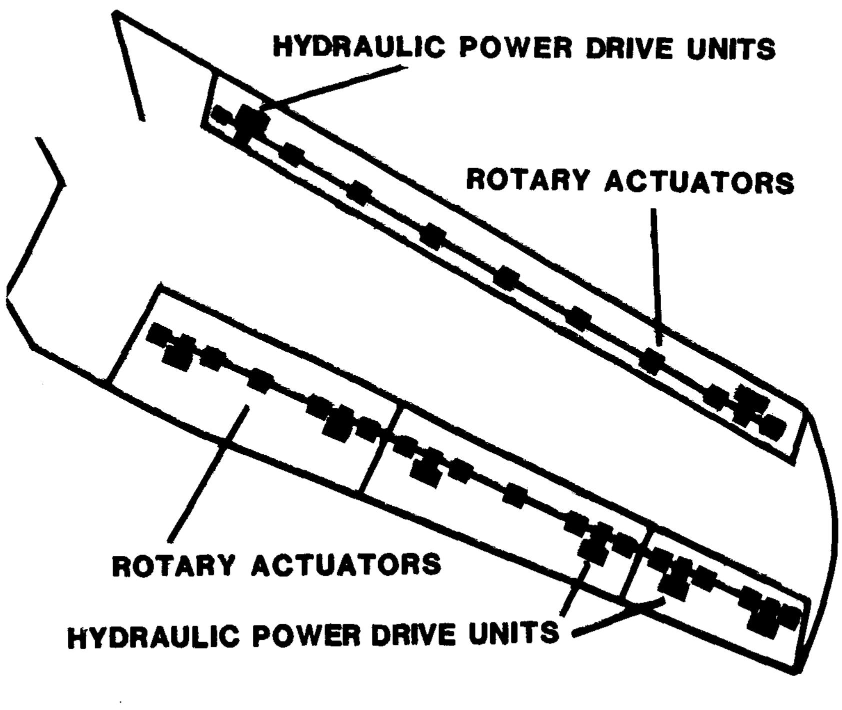
SPECIFICATIONS

LENGTH	73.5 ft.
WING SPAN	39.9 to 59.0 ft.
WING SWEEP	10 to 57.3 degrees
HEIGHT	17.1 ft.
EMPTY WEIGHT	58,655 lbs.
GROSS WEIGHT	86,075 lbs.

THE SMOOTH SURFACE VARIABLE CAMBER WING

The smooth surfaced variable camber wing consists of six independent trailing edge flaps (three per wing) and two leading edge flaps which provide a continuously variable camber. The leading edge flaps are driven as one and have a range of about one degree up to twenty degrees down. The inboard trailing edge flaps are driven symmetrically but the midspan and outboard flaps are independently driven for roll control. Each trailing edge flap ranges from about 1 degree up to 18 degrees down.

The actuation mechanism for the MAW consists of hydraulic power drive units, rotary actuators and brakes. There are two power drive units (located on the inboard and outboard portion of the flap) and brakes for each flap. Each power drive unit, either of which can drive the flap, is connected to a common drive shaft supplied by independent hydraulic systems. Several rotary actuators driven by the drive shaft, position each flap through a series of multibar linkages.



Hydraulic power is supplied to the MAW system by the F-111's primary and utility hydraulic systems. Additional accumulators have been added to both systems to accommodate the MAW system requirements.

Electrical power is provided by the aircraft's electrical power system through circuit breakers. A backup battery, as well as the F-111's battery supplies temporary power in the event of loss of normal power to the MAW system.

THE MAW CONTROL SYSTEM

The MAW control system is a redundant fly-by-wire system called the Flight Control Electronics Unit (FCEU) and operates largely independently of the F-111 flight control system. The FCEU consists of two synchronized digital computers for primary control of the flap surfaces and two analog computers for backup. Failure of a single primary system computer will cause reversion to the backup mode. In the primary mode, each digital computer controls one of the two power drive units in each flap, so that one computer cannot completely control a flap segment. A complete failure of the MAW control system will brake all flaps, deactivating the MAW functions, and the aircraft would revert to the basic F-111 flight control system without wing control surfaces.

Initially, MAW will be flown in the manual flight control system mode. In the manual mode the MAW software provides for the following features: Manual flexing of the flaps in symmetric pairs through the MAW cockpit control panel; trailing edge flap position limiting depending on dynamic pressure loads; flaperon (roll) control gain or stick sensitivity adjustment depending on dynamic pressure loads; roll control by differential deflection of outboard and midspan flaps versus the F-111's conventional spoiler system; preprogrammed flap position selection through the command programmer; positioning of flaps and configuring the F-111 flight control system for takeoff, landing and ground roll (for maximum braking) through the cockpit flap switch; lockout and positioning of inboard flaps for fuselage stowage when wing sweep exceeds 26 degrees; and failure monitoring of computers, actuators and sensors.

In the backup mode, the manual flexing, command programmer and ground roll functions do not function, though roll control through the flaperons is fail safe and the other features remain operative.

The cockpit MAW control panel provides control of all MAW functions and MAW system cannot be turned off in flight, though all flaps can be manually braked using control panel switches. A "safe" camber can be immediately selected by the gun trigger switch.

Follow-on flight research may include several limited automatic modes. These modes operate at wing sweeps of 26 and 58 degrees and in certain limited portions of the flight envelope.

Maneuver Camber Control (MCC), in which the leading and trailing edge flaps are optimally positioned according to the aircraft's Mach number and lift coefficent to maximize the lift to drag ratio.

In **Cruise Camber Control** (CCC) the trailing edges would search in increasingly small increments until a position which maximizes speed is found. The search routine would be continuously repeated.

In the **Maneuver Load Control** (MLC) Mode wing bending loads would be alleviated by raising trailing edge outboard flaps at the bending moment threshold of 95 percent. Raising the outboard flaps shifts the wing center of pressure inboard, reducing the bending moment. The limit load is continuously computed as a function of flight condition and aircraft loading. The MLC system would also provide stabilizer commands through the aircraft's flight control system.

The **Maneuver Enhancement/Gust Alleviation** (MEGA) mode is designed to improve vertical axis (up/down) response to the pilot's pitch inputs and reduce the response to turbulence. The mode would generate commands to the leading edge and trailing edge flaps, as well as the stabilizer through the F-111 flight control system. The mode could improve pitch response by as much as 50 percent and reduce gust response by as much as 30 percent.

THE MAW FLIGHT TEST PROGRAM

The primary objectives of MAW flight research are five-fold: 1. To quantify performance improvements over a baseline second generation transonic airfoil tested on the aircraft during the TACT or Transonic Aircraft Technology program. 2. To determine the representative airfoil camber for all major mission tasks. These include takeoff and landing, climb and descent, and cruise and maneuver dependent on flight conditions. 3. To evaluate total and sectional wing loading characteristics at specific flight conditions. 4. To determine handling quality characteristics and improvements in the buffet-free flight envelope. 5. To evaluate the MAW flight control system design, including its software, and determine its applicability to military and commercial airplanes.

The first part of the flight program will determine the basic airworthiness of the aircraft and its MAW systems. This series of test flights will investigate the aircraft's stability and control characteristics, its flutter envelope, its flight loads capabilities and the operation of the MAW control system.

The airworthiness certification and flight envelope expansion phases of the MAW flight research program are expected to be accomplished in about 15 flights during which the MAW aircraft performance will be gradually increased to speeds of approximately Mach 1.05 and altitudes of about 35,000 feet. The research phase calls for about 30 flights.

MAW MANAGEMENT

The AFTI F-111 Mission Adaptive Wing is a joint program of the NASA Ames-Dryden Flight Research Facility and the U.S. Air Force's Flight Dynamics Laboratory. Flight test will be conducted jointly by NASA Ames-Dryden and the

Air Force Flight Test Center (AFFTC). The Boeing Military Airplane Company is the manufacturer of the Mission Adaptive Wing.

Flight testing of the Mission Adaptive Wing will be conducted from NASA's Ames-Dryden Flight Research Facility, Edwards, California. Pilots for the MAW program include NASA civilian research pilots Rogers Smith and Einar Enevoldson and AFFTC test pilots Lt. Col. Frank Birk and Maj. Scott Parks.

-NASA Ames-Dryden-

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NASA TO TEST SPACE SHUTTLE TILES IN RAIN

Using an F-104 aircraft as a testbed, NASA's Ames-Dryden Flight Research Facility will test Space Shuttle thermal protection system tiles for moisture impact damage and to verify techniques to record and measure atmospheric moisture.

Adverse weather conditions such as rain, mist or ice particles can cause damage to Shuttle tiles. This possibility can force launch delays or landing shifts to another location during bad weather.

NASA researchers will correlate this information with existing launch and landing criteria and determine the need for further tests.

Actual Shuttle tiles will be installed on the leading edge of a flight test fixture, mounted below the F-104's fuselage. Some of these tiles are unused, while others flew in space on orbiter Columbia.

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During early flights in the 16-to-28 flight test program, the F-104 will fly behind a KC-135 tanker aircraft, beginning today. A water spray will be emitted from the tanker to create artificial rain. Tanker personnel can control the flow rate, nozzle pressures and to some degree the size of the artificial raindrops. These flights will be accomplished at lower subsonic speeds over the local test area.

Later flights will be conducted at subsonic speeds over the southern California coastal area near Vandenberg Air Force Base, a future Shuttle launch site, to observe and measure the effects of mist and low stratus clouds.

Other flight tests, at higher speeds, will be conducted at high altitude through ice particles in clouds. These flights will be flown at transonic and supersonic speeds.

Moisture particle size will be recorded by a particle-measurement probe located on the F-104's wing pylon, while impact forces will be measured by high-frequency load sensors on the flight test fixture. Velocity will be recorded through a noseboom on the flight test fixture, and pressure distribution will be measured through test fixture pressure orifices. Video cameras, one pylon mounted and one mounted on the F-104's lower fuselage looking back at the flight test fixture, also will record data.

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The flight test fixture was used to evaluate tile airloads prior to the first Shuttle mission.

This program is being conducted in support of NASA's Johnson Space Center.

-NASA Ames-Dryden-

September 30, 1985

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NASA AMES-DRYDEN ANNOUNCES KEY APPOINTMENTS

Thomas C. McMurtry has been appointed Chief of the NASA Ames-Dryden Flight Research Facility's Research Aircraft Operations Division.

In a related move, Fitzhugh L. Fulton is being named NASA Ames-Dryden Chief Pilot.

The Research Aircraft Operations Division is responsible for operating and maintaining all aircraft assigned to the Ames-Dryden Facility.

-NASA Ames-Dryden-

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NASA BEGINS NEW AIRFLOW EXPERIMENTS

NASA's Ames-Dryden Flight Research Facility has begun a series of flight tests using an F-14 jet fighter with a special wing covering that may aid in the design of future small transport aircraft.

These tests are being conducted as part of a cooperative program with NASA's Langley Research Center, with support in some glove design by the Boeing Commercial Airplane Company.

The covering, or glove, is expected to smooth the airflow over the wing and lead to more efficient flight at subsonic and transonic speeds. The glove will be located over the leading edge and top of the wing.

NASA researchers plan to gain information on airflow close to the surface known as boundary layer flow. The results will be added to a data base for airplane designers to draw on as they plan new business-sized to small commercial-sized transport aircraft.

The F-14 is an ideal testbed for these experiments since it offers variable wing sweep. Researchers can record information at varying wing sweep conditions from 20 to 35 degrees.

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The flight program will be conducted in two phases, both at subsonic and transonic speeds, using different wing gloves.

The gloves used will cover most of the wing and are made of a fiberglass/foam composite about 1/2 inch thick. A layer of fiberglass is first applied to the wing, then a foam core, then several layers of fiberglass.

Measuring devices are embedded in the gloves during the manufacturing process so that a smooth surface is maintained for natural laminar flow.

The first phase, about 15 to 20 flights, uses a glove on the left wing that simulates the F-14's actual airfoil to record baseline data for comparison with the second phase.

During the second phase, 35 to 40 flights, gloves specially designed for .7 Mach (approximately 450 miles per hour) and .8 Mach (approximately 525 miles per hour) flight speeds will be used. Researchers will analyze data taken at various flight conditions. Information will then be compared with baseline data and translated into reports on optimum flight conditions using natural laminar flow.

This effort is being conducted as part of a broad NASA program on laminar flow research.

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NASA FLIES FIRST LARGE SCALE INTEGRATED AIRCRAFT SYSTEMS

The first flight of an aircraft with both a digital jet engine control system and a mated digital flight control system has taken place at NASA's Ames-Dryden Flight Research Facility.

A modified F-15 jet aircraft performed the maiden flight of the Highly Integrated Digital Electronic Control (HIDEC) system. HIDEC provides coordinating communication between the aircraft's experimental flight control computer and engine control computer for better performance.

The flight took place June 25, 1986 from the Ames-Dryden facility at Edwards, California, and marks the first time such large scale integration efforts have been attempted in aircraft systems. The research mission was flown by NASA test pilot Thomas C. McMurtry.

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The integration of engine control and flight control computers is expected to provide significant aircraft performance improvements. The earlier Digital Electronic Engine Control (DEEC) system, which did not integrate with the flight control computers, provided engine performance and maintenance improvements. It allowed the engine to actively maintain its original engine thrust levels.

HIDEC uses a DEEC type engine control system but also adds flight control information such as altitude, Mach number, angle of attack and sideslip. The HIDEC system actively adapts to varying flight conditions, allowing the engine to operate closer to its stall boundary to gain additional thrust. Performance of the research engines used in the tests could be increased from "two to ten percent, depending on flight conditions," according to NASA Ames-Dryden HIDEC Project Manager, Gary Trippensee.

The HIDEC program, which will evaluate engine/aircraft performance gains by using large scale integration techniques, began its adaptive engine control system flight research phase with the maiden integrated flight and this phase is expected to continue through this summer. A later phase of the HIDEC program will investigate Integrated Flight Path Management including trajectory optimization for minimum time and fuel usage, complex optimum intercepts and four dimensional navigation.

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Modifications of the HIDEC F-15 aircraft include a Digital Electronic Flight Control System manufactured by Lear Siegler and a Pratt & Whitney developmental PW1128 turbine engine propulsion system provided by the Air Force.

McDonnell Douglas Corporation is the principal contractor responsible for the integrated systems design. NASA's Ames-Dryden Flight Research Facility manages the HIDEC research flight program.

-NASA Ames-Dryden-

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WILLIAM H. DANA APPOINTED CHIEF PILOT AT NASA FACILITY

William H. Dana has been appointed Chief Pilot at NASA's Ames-Dryden Flight Research Facility, effective immediately. He replaces Fitzhugh L. Fulton, who recently retired.

Dana has been with NASA since 1958 as an aerospace research pilot. He flew the famed X-15 rocket-powered research aircraft 16 times, reaching a top speed of 3,897 miles per hour and a peak altitude of 310,000 feet (almost 59 miles high).

His current piloting assignment is as project pilot on the F-15 Highly Integrated Digital Electronic Control program. He also flew the triple-sonic YF-12 research aircraft.

Dana flew as a pilot on the manned lifting body flight test program. Wingless lifting bodies, flight tested at Ames-Dryden, were the forerunners of the Space Shuttle. For his outstanding efforts in this program, Dana was awarded NASA's Exceptional Service Medal and in 1976 received the American Institute of Aeronautics and Astronautic's Haley Space Flight Award for his work on the M2-F3 control systems research.

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Dana is a graduate of the U.S. Military Academy and a member of the Society of Experimental Test Pilots.

He and his wife, the former Judy Miller, have four children and reside in Tehachapi, California.

-NASA Ames-Dryden-

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X-WING RESEARCH AIRCRAFT SET FOR DELIVERY TO NASA

An unusual looking vehicle developed to test a revolutionary new hybrid rotor/fixed wing concept called X-Wing is now set for delivery to NASA's Ames-Dryden Flight Research Facility, Edwards, California, in late September.

The vehicle, the RSRA/X-Wing, is a combination of the NASA/Army Rotor Systems Research Aircraft (RSRA) and the DARPA/NASA-developed X-Wing. It is scheduled to begin flight tests later this fall at Ames-Dryden.

The RSRA/X-Wing program is a joint NASA/Defense Advanced Research Projects Agency (DARPA) effort, with technical support from the U.S. Navy.

NASA's Ames Research Center, Moffett Field, California, is responsible for overall project management of the RSRA/X-Wing flight investigation program, with flight test at Ames-Dryden. Sikorsky Aircraft, the manufacturer, will conduct the flight test program under the direction of Ames.

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The RSRA/X-Wing flight investigations are a major step in the development of an eventual X-Wing vehicle which could provide an efficient combination of the vertical lift characteristics of conventional helicopters with the high subsonic cruise speed of fixed-wing aircraft.

The X-Wing uses a four-bladed helicopter-like rotor system that rotates for takeoffs, landings, and low speed flight. The rotor system is stopped in flight at approximately 175 to 230 m.p.h. to act as a fixed X-shaped wing for high speed flight.

In the X-shape, two blades will be swept forward at 45 degree angles, and two swept to the rear at the same angles.

Successful demonstration in flight of conversion of the rotor/wing system from fixed to rotating and back again is the prime objective of this program. Since testing will be conducted on the RSRA, the top speed during this program will not exceed approximately 290 m.p.h.

The test bed used for these tests is one of two RSRAs originally built by Sikorsky for use by NASA and the U.S. Army as "flying wind tunnels" for evaluating new rotor designs under actual flight conditions. The RSRA has a variable-incidence fixed-wing in addition to the rotor system.

The RSRA/X-Wing aircraft will first be flown without the rotor and then with the X-Wing installed in a fixed position.

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Rotary tests will be next, followed by conversion tests which will complete the program.

Circulation control, an air blowing system, is used to provide lift. It will be used first with the X-Wing non-rotating, then rotating. As testing proceeds, rotor turning and circulation control development will enable researchers to gradually achieve more lift with the rotor rather than depending on the aircraft fixed-wing.

The air circulation control system consists of a compressor, a plenum air chamber with 48 control valves, a duct system and slots in the blades. The compressor feeds air into the chamber, located around the rotor hub. This air is directed by valves through rotating receiver ducts which feed the air through the hollow blades to slots in the leading and trailing edges of the blades. Twenty-four of the valves provide air circulation for the leading edges, and 24 for the trailing edges.

The computer-controlled air circulation control system is most critical during conversion. During the approximately 30 seconds it takes for conversion, air velocity around the blades is reversed. The pressurized air blown through blade leading and/or trailing edges during this critical period maintains equal lift and keeps the aircraft flying smoothly through conversion.

Key to the air circulation system is the Coanda principle, which holds that air forced over a curved aerodynamic surface

-more-

will follow the curve and trap the surrounding air, which produces lift. This lift can be controlled by varying the amount and pressure of the air being supplied by the blowing system.

Advanced composite materials are used in the four rotor/wing blades which each have a 28.8-foot radius and a 3-foot chord measurement and consist of a hollow sleeve bonded to a graphite I-shaped rigid beam. Both sleeve and I-beam are clamped in position to a titanium hub. The composites make possible greater rigidity which is required because of the dual requirements of rotor and fixed operations and also have the ability to withstand heat generated by the circulation control system. The I-beam, while rigid, has enough flexibility to be mechanically adjusted to help provide collective pitch control.

The RSRA/X-Wing digital fly-by-wire flight control system, which also controls the air circulation control system and the RSRA fixed-wing control surfaces, is quad-redundant. Each of the four computers contain primary and backup software necessary for safe flight.

Since the entire system comprises more than a normal flight control system, it is referred to as a vehicle management system and also includes the systems that engage and stop the X-Wing blades and control the pneumatic compressor.

The vehicle is powered by four General Electric engines. Two TF-34 turbofans provide thrust for RSRA fixed-wing flight and

-more-

two T-58 turboshaft engines power the X-Wing rotary blade system and provide power to the tail rotor and pneumatic compressor.

Developers foresee future X-Wing aircraft not as replacing current fixed-wing or rotary-wing aircraft, but as aircraft with enhanced capabilities to perform missions which call for the low-speed efficiency and maneuverability of helicopters, combined with the high cruise speed of fixed-wing aircraft. Potential military missions include search and rescue, air-to-air and air-to-ground tactical operations, airborne early warning, electronic intelligence, and antisubmarine warfare.

A civil version could eventually provide high-speed passenger transportation with city-center takeoff and landing capability.

-NASA Ames-Dryden-

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NASA OFFICIAL RECEIVES TWO MAJOR AWARDS

The American Institute of Aeronautics and Astronautics recently awarded NASA Ames-Dryden Flight Research Facility official Dr. Kenneth W. Iliff the Dryden Lectureship in Research. He was also elected a Fellow of the AIAA in recognition of his many contributions to aerospace knowledge.

The Dryden Lectureship is presented yearly to emphasize the importance of basic research to advances in aeronautics and astronautics. It is named in honor of Dr. Hugh L. Dryden, a former deputy administrator of NASA and well-known scientist, for whom the Ames-Dryden facility was also named.

Iliff's election as an AIAA Fellow was by current AIAA Fellows in recognition of his scientific and technical leadership. AIAA Fellows are elected for notable contributions to aeronautics or astronautics.

Topic of Iliff's lecture will be "Aircraft Parameter Estimation." The ten-lecture tour begins in September and will be given throughout the United States.

-more-

"Parameter estimation is the process of formulating the questions once you know the answers," according to Iliff. "From the way the aircraft flies - the answers - you determine what makes it fly that way - the questions."

Iliff, currently chief of the Fluid and Flight Mechanics Branch, has been with Ames-Dryden since 1962. He holds B.S. degrees in Aerospace Engineering and in Mathamatics from Iowa State, an M.S. in Mechanical Engineering from the University of Southern California, and a Ph.D. in Mathematical Theory of Systems from the University of California, Los Angeles.

He and his wife, Mary F. Shafer, are Lancaster residents. Ms. Shafer is an aerospace engineer with Ames-Dryden.

-NASA Ames-Dryden-

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SHUTTLE TILE TESTS CONTINUE

A supersonic jet and a subsonic aircraft used to probe hurricanes are helping NASA researchers in efforts to determine the effects of moisture damage to Space Shuttle thermal protection system tiles.

Since Space Shuttle tiles can be damaged by rain, and possibly mist or ice particles, adverse weather that could cause tile damage can force launch delays.

Current testing by researchers at NASA's Ames-Dryden Flight Research Facility utilizes a NASA F-104 jet with tiles installed on a flight test fixture mounted below the fuselage. These tests were begun in 1985.

Recently, a National Oceanic and Atmospheric Administration P-3 fitted with extensive atmospheric instrumentation and tiles mounted on a pylon on the right wing has been assisting in tests.

P-3 testing concentrates on observing the effects of larger drops of moisture at lower speeds, while F-104 tests concentrate on smaller drops at higher speeds.

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The P-3 is equipped with onboard radar, which assists in identifying areas of adverse weather conditions. This information can be relayed to the F-104, thus enabling both aircraft to be directed into areas that will provide the most information.

Both aircraft are equipped with probes to measure raindrop size at low altitudes and ice particles found in clouds at higher altitudes.

According to Ames-Dryden principal investigator Robert R. Meyer, "Use of the P-3 will enable us to calibrate and verify our testing procedures. We would like to do further testing this summer in Florida to get some experience in tropical storms."

In addition to observing moisture damage, researchers will develop and verify operational procedures for future testing.

The NOAA aircraft is based in Miami, but has been used to comduct environmental research worldwide.

The test program is being conducted in support of NASA's Johnson Space Center.

-NASA Ames-Dryden-

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NASA BEGINS SUPER MANEUVERABILITY AND SAFETY RESEARCH FLIGHTS

Super maneuverability and prevention of dangerous spins and related crashes are the aims of a new, aircraft flight research program beginning at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif. The maiden flight of the NASA High Alpha or high angle-of-attack research program is scheduled for late this month.

The research could revolutionize the way in which high performance jet aircraft are flown, greatly increasing their maneuverability, allowing their pilots a greater margin of safety in radical maneuvers and saving millions of dollars in design, testing and post-production redesign.

Using a specially equipped and instrumented F/A-18 Hornet jet fighter loaned from the Navy, the flight research will investigate airflow surrounding the aircraft in high angle-of-attack attitudes, flight in which the airplane is nose-high relative to its flight path, and post-stall maneuverability assisted by thrust vectoring (deflecting the jet's engine exhaust).

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The NASA High Alpha program will create a data base that engineers can use to more clearly understand flight at high angles of attack and determine design criteria for utilizing high alpha aerodynamics. The data base will permit more efficient computer-aided design of aircraft and is expected to decrease wind tunnel and flight testing time. Costly post-production design "fixes" also may be minimized with the greater understanding of high angle-of-attack flow provided by the NASA data base.

In high angle-of-attack attitudes, airflow around an aircraft becomes quite complex and most aircraft handle poorly in such situations. Scientifically understanding and predicting the complex interactions of the airflow is difficult. By equipping a NASA F/A-18 research aircraft with systems to visualize high alpha airflow, researchers will collect basic research data for scientific study.

Part of the flow visualization data will be gathered by generators expelling smoke from the forward portion of the aircraft. The smoke will delineate vortex flows - virtual mini-tornados that can be used for high alpha control. The vortices start at the F/A-18's leading edge extensions and nose and pass over the aircraft's tail control surfaces. Other flow data will be gathered by injecting colored dye fluids into the airflow from small ports in the aircraft's nose and by more conventional aerodynamic data gathering devices such as pressure transducers.

Later experiments are planned to equip the F/A-18 with special turning vanes that deflect the engine exhaust of the aircraft while in high angle-of-attack situations. The deflected exhaust stream can be used for aircraft directional control in high alpha situations.

The program is expected to extend to the autumn of 1992. Thrust-vector-control flights are expected to begin during late 1989. The NASA High Alpha program is a cooperative effort of the Ames Research Center, Moffett Field, Calif., and Langley Research Center, Hampton, Va., with the Lewis Research Center, Cleveland, Ohio participating in propulsion related areas.

The flight research is managed and conducted by Ames-Dryden Flight Research Facility.

-NASA Ames-Dryden-

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EXPERIMENTAL AIRCRAFT ENTERS SECOND PHASE OF FLYING

The experimental, forward-swept-wing X-29 aircraft has completed its first phase and moved into the second of its flight research program at NASA's Ames-Dryden Flight Research Facility, Edwards, California.

During the first phase, seven pilots from NASA, the U.S. Air Force, Grumman Aerospace Corp. and the U.S. Navy flew the aircraft a total of 104 flights.

The experimental X-29, with its three-surface pitch control system - canards, wing flaps and strake flaps - was flown to about 1.5 times the speed of sound and to an altitude of 50,200 feet.

The airplane's flying characteristics were observed by researchers during expansion of the X-29 flight envelope, i.e., the airplane's operational bounds. The X-29's performance proved close to that predicted. Successful demonstration of flight was achieved with an aircraft which is 35 percent flight unstable.

Following completion of the first phase, the airplane was prepared for more intensive research flying. Preparations include installation of a calibrated engine with two thrust-measuring systems for performance data, a NASA noseboom calibrated for air data measurements and an upgraded instrumentation system.

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During the second flight phase, NASA researchers will further investigate the forward swept wing structural divergence tendencies and the overall aerodynamic performance of the wings and canards.

Effects of the X-29's unique configuration on buffet, ground effects and structural loads will be intensively studied, as will the aircraft's control system and handling qualities. Researchers also will investigate maneuvering characteristics applicable to military use.

Evaluation of the thrust computation techiques developed for the calibrated engine is another goal. The F404 engine was calibrated in a wind tunnel by NASA's Lewis Research Center, Cleveland.

The second phase of the X-29 research program is planned to be completed by the summer of 1988.

-NASA Ames-Dryden-

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SECOND-PHASE FLIGHT TESTS SET FOR MISSION ADAPTIVE WING

Following conclusion of a successful first phase, the Advanced Fighter Technology Integration (AFTI) F-111 aircraft, with its Mission Adaptive Wing (MAW), is entering its second phase of research flying at NASA's Ames-Dryden Flight Research Facility, Edwards, California.

The aircraft's wing has been modified so that the curvature of both the leading and trailing edges can be varied in flight. This enables the airplane to fly with optimum wing curvature at subsonic, transonic and supersonic speeds, thus offering the potential for greater efficiency of flight.

The F-111's variable wing sweep adds to MAW research capability by allowing simulation of various aircraft with differing wing sweeps.

During the first phase, 26 flights were flown by five NASA and U.S. Air Force test pilots. The MAW system was operated in a manual mode only, with preprogrammed wing curvature selected by the pilot.

Results indicated good agreement between actual flight performance and wind tunnel data used for predictions, according to NASA Ames-Dryden Project Manager Louis L. Steers.

-more-

In preparation for the second phase, the first-phase computers were modified to enable automatic adjustment of wing curvature and reinstalled in the AFTI F-111 aircraft along with other instrumentation. Ground tests in this joint NASA/USAF program were performed to check various systems.

Researchers plan to evaluate the MAW system in automatic modes and to complete research in the manual mode during the second phase, now scheduled to be completed in summer 1988. Computer programs will direct the system to adjust for optimum wing performance based on pilot inputs and other instrumentation information.

-NASA Ames-Dryden-

August 3, 1987

NASA News

National Aeronautics and
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Ames Research Center
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P.O. Box 273
Edwards, California 93523
AC 805 258-8381

RELEASE NO. 87-10 FOR RELEASE: IMMEDIATE

Nancy Lovato
(805) 258-8381

NASA COMPLETES AIRFLOW EXPERIMENTS; RETURNS F-14 TO NAVY

NASA's Ames-Dryden Flight Research Facility has completed natural laminar, or smooth, airflow tests using an F-14 jet fighter and has returned the aircraft to the U.S. Navy. Data from these tests will add to information available to designers of future, lower drag, more efficient aircraft.

Special wing coverings, or gloves, were used to provide the proper wing profiles to smooth the airflow over the wings for these tests, which were designed to enable NASA researchers to obtain information about airflow close to the surface known as boundary layer flow. The F-14 was used because of its variable wing sweep, which made possible the acquisition of aerodynamic information from 20 to 35 degrees wing sweep.

Preliminary results indicate that the wing coverings, which basically smoothed out the normal wing configuration, achieved more laminar flow at higher wing sweep angles, according to principal investigator Bianca Trujillo.

The tests also enabled investigators to improve techniques for laminar flow measurement and for the fabrication of fiberglass/foam surfacing used for the gloves. Video from another aircraft gave researchers a close look, made possible by the use of liquid crystals applied to the gloves, at changes that occurred in boundary layer airflow as the F-14 aircraft moved through the air.

These tests were part of a cooperative program with NASA's Langley Research Center.

The gloves have been removed from the F-14 and the aircraft has been returned to the Navy for fleet use.

-NASA Ames-Dryden-

September 2, 1987

NASA News

National Aeronautics and
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RELEASE NO. 87-11

FOR RELEASE: September 25, 1987
1:00 p.m. PDT
Simultaneously released in
Washington, D.C.

Nancy Lovato
Ames-Dryden Flight Research Facility, Edwards, California
(Phone: 805/258-8381)

Debra Rahn
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

NASA AMES-DRYDEN FLIGHT RESEARCH FACILITY SELECTS CONTRACTOR

NASA's Ames Research Center, Moffett Field, California, has selected Engineering Design Group, Inc., Houston, Texas, for final negotiations leading to award of a new 5-year support contract with a proposed value of approximately $16 million.

Work on the cost-plus-fixed fee contract will begin approximately October 15, 1987. Services will be performed at the Ames-Dryden Flight Research Facility, Edwards, California.

Services to be provided include maintenance, repair and operations of facilities, custodial tasks and Space Shuttle facilities support.

-NASA Ames-Dryden-

September 25, 1987

NASA News

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
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AC 805 258-8381

RELEASE NO. 87-12

FOR RELEASE: IMMEDIATE
(RELEASED SIMULTANEOUSLY IN
WASHINGTON, D.C.)

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Les Reinertson
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

NASA AWARDS CONTRACT FOR INTEGRATED TEST FACILITY

NASA's Ames-Dryden Flight Research Facility, Edwards, California, has entered negotiations to award a $16,184,800 fixed-price contract to Continental Construction Corp., Las Vegas, Nev., for construction of an Integrated Test Facility (ITF) to support testing of advanced aircraft and their complex, interdependent systems.

The new facility will allow NASA to significantly reduce aircraft systems checkout time and costs since researchers will be able to integrate all systems in a controlled manner while they are being tested rather than being limited to separate systems checkouts.

When completed, the ITF will be the only site in the free world that offers complete systems checkout and testing capability in one fully equipped facility. The ITF can accommodate up to six different aircraft at once.

The facility will consist of aircraft test bays, laboratories, office space and associated work space. The test bays will be configured to enable NASA researchers to thoroughly test all aircraft systems, such as flight controls, avionics, electrical and others at the same time in a safe and efficient manner prior to actual flight.

-more-

In flight, the pilot controls the aircraft with the aid of sophisticated computers that direct the airplane's systems to work together for best overall flight performance. In the ITF, ground computers will be used to test the aircraft's systems independently and together, giving the closest simulation to flight possible, including use of the actual airplane.

"We will be able to stimulate each system to respond as if in flight by use of the ITF," says ITF Manager Charles A. Brown. "It will work, in simple terms, much the same as an automobile diagnostic facility. We'll plug in all the systems and conduct our tests."

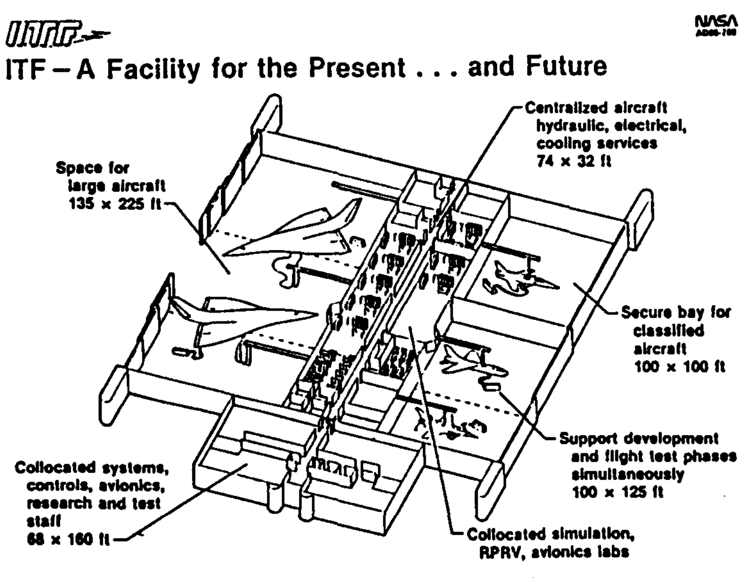
Using the integrated testing approach, researchers will monitor and record "crosstalk," or the communications among separate systems, to evaluate how each system affects the others. Each test will be documented and the information stored in ITF computers for referral and future use.

Construction of the 120,000 square-foot, multi-story building is scheduled to begin this fall and will be completed in about 2 years.

- NASA Ames-Dryden -

October 26, 1987

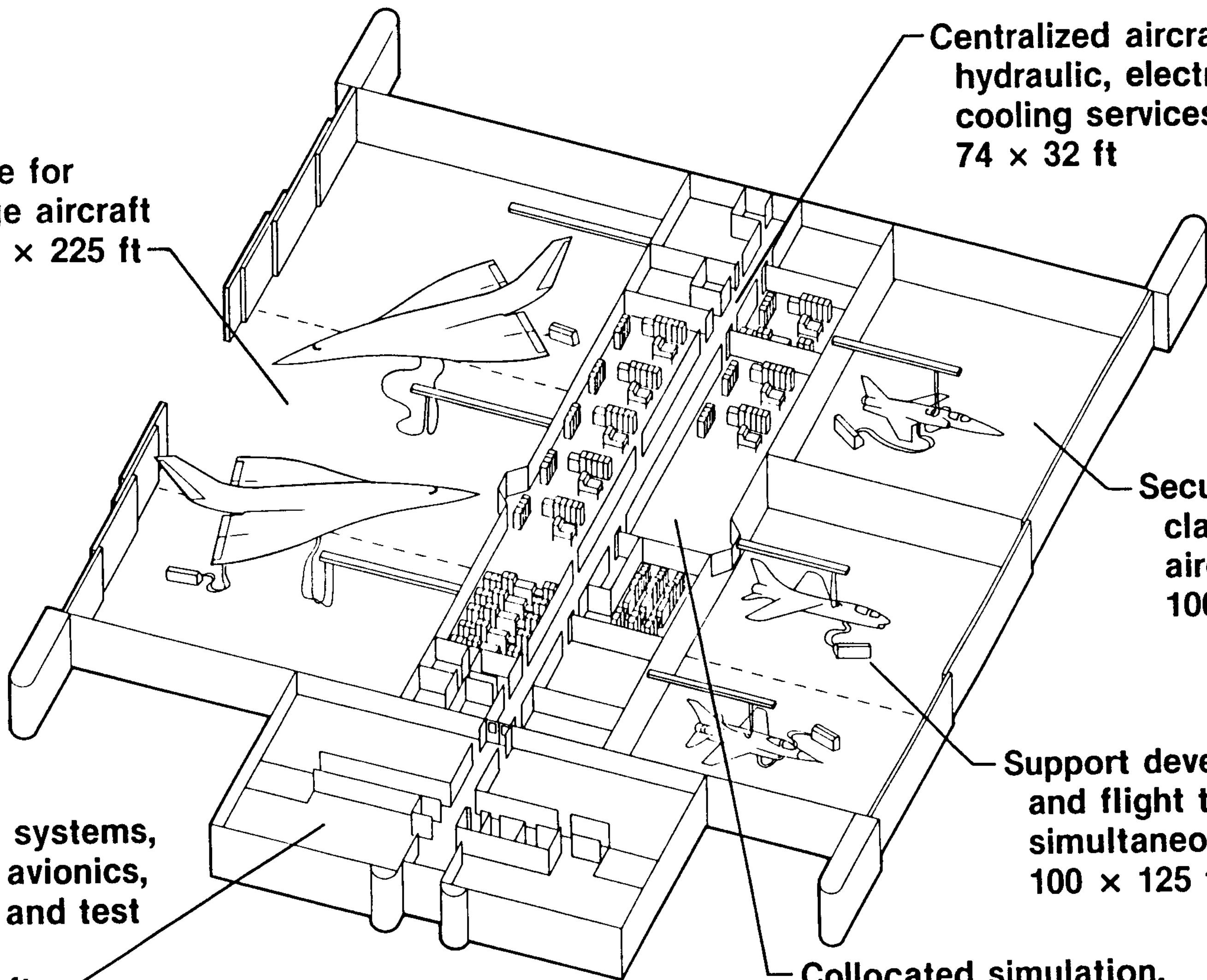
A photograph is available to illustrate this release by calling 202/453-8383. B&W: 87-H-268



ITF

NASA
AD86-789

ITF – A Facility for the Present . . . and Future



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RELEASE NO. 87-13 FOR RELEASE: IMMEDIATE

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NOTE TO EDITORS:

The NASA/DARPA Rotor Systems Research Aircraft (RSRA), modified to test a hybrid rotor/fixed wing technology concept called X-Wing, is now scheduled to begin flight tests at NASA's Ames-Dryden Flight Research Facility, Edwards, California. First flight is presently planned for November 20, 1987, at 6:30 a.m. PDT.

The RSRA used for these tests is one of two built for NASA and the U.S. Army to test advanced rotor concepts. It has been reconfigured to test the X-Wing concept, which would use a four-bladed rotor system for vertical takeoff and landing. Once in flight, the blades could be stopped in an X-wing shape, two forward and two aft, and be used as fixed wings for horizontal flight.

For the initial series of flights, the X-Wing blades will not be installed on the RSRA. Prime purpose of these flights is to check out the basic stability of the aircraft in its new configuration.

The RSRA/X-Wing program, a joint NASA/Defense Advanced Research Projects Agency effort, is managed by NASA's Ames Research Center, Moffett Field, California, with flight test at Ames-Dryden. Sikorsky Aircraft, the manufacturer, conducts the flight test program under the direction of NASA.

Pilots will be G. Warren Hall, NASA Ames, and W. Richard Faull, Sikorsky Aircraft.

-end-

Media wishing to cover this event should contact the NASA Ames-Dryden Public Affairs Office in advance at (805) 258-8381.

November 17, 1987

NASA News

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RELEASE NO. 87-16 FOR RELEASE: IMMEDIATE

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NASA ENGINEER INDUCTED INTO NATIONAL HALL OF FAME FOR PERSONS WITH DISABILITIES

Dr. Kenneth W. Iliff, chief of the Fluid and Flight Mechanics Branch at NASA's Ames-Dryden Flight Research Facility, Edwards, California, has been inducted into the National Hall of Fame for Persons With Disabilities.

Induction ceremonies were held in Columbus, Ohio, on October 17, 1987, with Iliff in attendance. Dr. Dale Compton, Deputy Director of the Ames Research Center, represented NASA in honoring Dr. Iliff at the ceremony. Previous inductees include former President Franklin D. Roosevelt and Helen Keller.

Iliff, 46, has been confined to a wheelchair since contracting poliomyelitis at the age of 9. According to Elizabeth Davis, chairperson of the Ames-Dryden Handicapped Employees Committee, "Dr. Iliff is an example for everyone, handicapped or not. He is an outstanding engineer who happens to be in a wheelchair."

Iliff, who has been with Ames-Dryden since 1962, is known internationally as an expert in aircraft parameter estimation. This field of research determines the makeup of equations that describe a system by using the response of that system, i.e., if you know how the system responds you can determine the nature and structure of the system. His research codes are used by virtually all flight test organizations in the United States, Canada, Great Britain, Western Europe, Japan, Australia, and India. They are also used for identification of other dynamic systems, including submarines, economic models, and biomedical models.

Iliff has worked on most of the advanced research aircraft flown by NASA in the past 25 years, including the famed rocket-powered X-15, the XB-70, and the Space Shuttle.

-more-

In addition to his recent Hall of Fame induction, Iliff has been the recipient of many honors. He has received the NASA Exceptional Scientific Achievement Award, which is NASA's highest scientific award; NASA's Outstanding Handicapped Employee award in 1973; and many other NASA group and individual awards.

Iliff was recently elected a Fellow of the American Institute of Aeronautics and Astronautics, the top professional organization in his field. He received the AIAA's Dryden Lectureship in Research for 1987 in recognition of his significant contributions to aeronautical research.

He has also authored over 80 national and international technical papers, articles, and reports. He has given 11 invited lectures to international organizations in addition to participation in many national conferences and panels. He is currently chairman of the AIAA Atmospheric Flight Mechanics Technical Committee.

Iliff is also Adjunct Professor of Electrical Engineering at the University of California, Los Angeles, and is the Associate Director of the NASA Ames-UCLA Laboratory for Flight Systems Research.

In addition to his technical accomplishments, Iliff served on the NASA Ames Equal Employment Opportunity Committee for ten years, and is a member of the California Association of the Physically Handicapped and the Foundation for Science and the Handicapped.

Iliff received a B.S. in Mathematics and a B.S. in Aerospace Engineeering in 1962 from Iowa State University; an M.S. in Mechanical Engineering in 1967 from the University of Southern California; and a Ph.D. in Mathematical Theory of Systems in 1973 and an M.S. in Engineering Management in 1978, both from the University of California, Los Angeles.

Iliff and his wife, Mary Shafer Iliff, an aerospace engineer at Ames-Dryden, reside in Lancaster, California.

-NASA Ames-Dryden-

November 25, 1987

NASA News

National Aeronautics and
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Barbara Selby
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

Feburary 26, 1988

Barbara Schwatz
Johnson Space Center
(Phone: 713/483-5111

NOTE TO EDITORS: SHUTTLE CREW POLE ESCAPE TEST

Space Shuttle crew pole escape system tests are underway at Edwards Air Force Base, Calif. Reporters and photographers will be able to view six Navy parachutists during one of the tests on March 2. The jumpers, using a lanyard attached to the pole, will slide down the pole extending from a C-141 aircraft flying at 200 knots at an altitude of approximately 10,000 feet.

Objectives of the tests are to establish the feasibility of this concept for crew egress and to determine the margins on orbiter wing clearance. The telescoping pole is one of two methods currently being evaluated -- the other is the tractor rocket extraction system. A decision on which of the two egress methods may be incorporated into Discovery will be made after test data is analyzed and recommendations are made to Shuttle program managers.

Test program managers (NASA and Air Force), Navy parachutists and NASA astronauts will participate in a question-and-answer session on the runway next to the C-141 aircraft after completion of the test.

Those planning to attend should call Barbara Schwartz (713/483-5111) by February 29 or Nancy Lovato (805/258-8381) by March 1. News media representatives should meet at the Public Affairs Office at Ames-Dryden Flight Research Facility, Edwards, Calif., no later than 7:30 a.m. PST, March 2 to caravan to the test site. This caravan will be the only access to the press site.

-end-

NASA News

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RELEASE NO. 88-5 FOR RELEASE: IMMEDIATE

Ralph B. Jackson
Nancy Lovato
(805) 258-8381

NOTE TO EDITORS: STS-26 LANDING ACCREDITATION

NASA's Ames-Dryden Flight Research Facility, Edwards, California, is now accepting accreditation requests from news media planning to cover the landing portion of the STS-26 Space Shuttle Discovery mission, presently scheduled for September 1988.

Requests for accreditation must be made on company letterhead and must be signed by an assignment editor or other supervisory official. The names and assignment of each individual must be listed, as well as the number of vehicles and their function. Freelance writers and photographers must offer proof of assignment.

Accreditation requests should be addressed to: NASA Ames-Dryden Flight Research Facility, Attention: DXI/Public Affairs, P.O. Box 273, Edwards, California 93523.

Accreditation from other NASA centers is valid at Ames-Dryden, however, media will still need to obtain a vehicle pass in order to enter Edwards Air Force Base.

Only working news media will be accredited. We will make arrangements for other media employees and dependents at a separate viewing site.

No one under 16 years of age will be allowed at any press site. Violation of this rule will result in cancellation of press site privileges for responsible parties.

-more-

Philatelic publications must meet the criteria of general publications or be national publications of recognized philatelic organizations. Representatives of catalogs, newsletters, local clubs or profit seeking projects will not be accredited. Conducting philatelic business, other than reporting, will not be tolerated.

College news media are limited to two accredited correspondents.

You must present either your letter of acceptance or badge from another center, along with a photo identification, at the accreditation center for credentials.

NASA can make no travel or housing arrangements.

Media covering the landing should stay only in approved press sites; the rest of Edwards AFB is off-limits. Violation of rules will result in the loss of press badges and press site privileges.

-NASA Ames-Dryden-

July 11, 1988

NASA News

National Aeronautics and
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Ames Research Center
Dryden Flight Research Facility
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AC 805 258-8381

RELEASE NO. 88-7 FOR RELEASE: IMMEDIATE

Ralph B. Jackson
Nancy Lovato
(805) 258-8381

NOTE TO EDITORS:

A briefing on media operations for the STS-26 Space Shuttle landing will be conducted in the NASA Ames-Dryden auditorium at 9:00 a.m. on September 9, 1988.

Items to be covered include: press facilities, locations, hours of operation, access, and what NASA can and cannot provide. The briefing will include a trip to the lakebed press site.

-NASA Ames-Dryden-

August 23, 1988

NASA Facts

National Aeronautics and
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AC 805 258-8381

RELEASE NO. 89-1

FOR RELEASE: IMMEDIATE
(ALSO RELEASED BY
NASA HEADQUARTERS,
WASHINGTON, D.C.)

Lisa Fowler
Kennedy Space Center, Fla.
(Phone: 407/867-2468)

Nancy Lovato
Ames-Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

EDITORS NOTE: STS-29 NEWS MEDIA ACCREDITATION

NASA is accepting accreditation requests for news media to cover the Space Shuttle Discovery mission (STS-29), currently targeted for launch in February.

All news organizations wishing to send representatives to cover STS-29 must send a letter requesting accreditation for the mission. STS-27 requests for credentials do not apply to subsequent missions and new requests must be submitted.

Requests for credentials, launch through landing, should be submitted to:

NASA John F. Kennedy Space Center
PA-PIB/Accreditation
Kennedy Space Center, Fla. 32899

Please indicate the NASA location(s) from which you plan to cover the mission. Media planning to cover the landing only should submit their requests for accreditation to:

NASA Ames-Dryden Flight Research Facility
Attn: DXI/Public Affairs
P.O. Box 273
Edwards, Calif. 93523

- more -

Requests for accreditation must be made by a supervisory official other than the applicant on company letterhead, clearly indicating the assignment (reporter, photographer, technician, etc.) and social security number of each individual. Freelance writers and photographers must offer proof of assignment or evidence of past professional activity. The accreditation will be valid for all NASA news centers.

NASA ground rules for newspersons covering the mission are:

o NASA can make no travel or housing arrangments.

o Only working newspersons will be accredited at the news centers. Publishers and other news and advertising executives will not be accredited. Those individuals should apply to NASA Public Services Division (LP), NASA Headquarters, Washington, D.C., 20546.

o Friends, dependents or relatives not covering the mission will not be accommodated.

o No one under 16 years of age will be allowed at the press site under any circumstances. Violation of this rule will result in cancellation of press site privileges for responsible parties.

o Philatelic publications must meet the criteria for general publications or be national publications of recognized philatelic organizations. Representatives of catalogs, newsletters, local clubs or profit seeking projects will not be accredited. Conducting philatelic business, other than reporting, is not permitted.

o College news media are limited to two accredited correspondents.

o Media representatives must present their letter of acceptance and a photo identification to obtain a news media badge at the appropriate center.

o Violations of the rules will result in loss of press badge and press site privileges.

-end-

January 10, 1989

NASA News

National Aeronautics and
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RELEASE NO. 89-2

FOR RELEASE: IMMEDIATE
(ALSO RELEASED BY
NASA HEADQUARTERS,
WASHINGTON, D.C.)

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Dryden Flight Research Facility, Edwards, Calif.
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Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

NASA COMPLETES FIRST X-29 FLIGHT RESEARCH, PREPARES FOR SECOND

Researchers and pilots at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., have completed flight tests on the first experimental forward-swept-wing X-29 aircraft and are planning high angle of attack flight tests, now scheduled for spring 1989, for the second X-29.

Investigations of the X-29's flight controls, flying qualities and its extensive use of composite materials have shown that the forward-swept-wing concept is practical and have added to the data base for the design of future aircraft.

"We have proven that the design is viable," says NASA X-29 Program Manager Gary Trippensee. "Our next step is to look at low-speed, high angle-of-attack characteristics of a forward-swept-wing aircraft using the second X-29."

During pitching maneuvers, angle of attack is the angle of the nose of an aircraft relative to its flight path. The ability to fly and maneuver at high angles of attack can provide great advantages to pilots of high-performance aircraft in situations requiring super maneuverability.

- more -

While aircraft-1 has been limited to 20 degrees angle of attack, aircraft-2 has been modified to permit safely flying at higher angles of attack. Researchers plan to increase angles by increments to a maximum of about 80 degrees.

Aircraft-2 has been equipped with a safety parachute for spin recovery and instrumentation has been modified to aid in high angle-of-attack measurements

During its two-phase, 4-year flight program, X-29 aircraft-flew a total of 242 flights, a record number for an X-series or experimental, high-performance aircraft.

Twenty pilots flew in the joint NASA/USAF program: seven from NASA, nine from the U.S. Air Force, one from the U.S. Navy, and three from Grumman Aerospace, the airplane's manufacturer. The last flight was flown by NASA test pilot Rogers Smith.

NASA project pilot is Stephen D. Ishmael, with Smith flying as co-project pilot. Air Force project pilot is Major Alan Hoover.

- end -

January 19, 1989

NASA News

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RELEASE NO. 89-3 FOR RELEASE: IMMEDIATE

Nancy Lovato
(8Ø5) 258-8381

VIEWING AREA AVAILABLE FOR SHUTTLE LANDING

The East Shore Viewing Site at Edwards Air Force Base, California, will be available for viewers wishing to observe the landing of the Space Shuttle Discovery, mission STS-29, now scheduled for approximately 6:15 a.m. PST on March 16, 1989, according to officials at NASA's Ames-Dryden Flight Research Facility at Edwards.

Vehicle passes are not required for the East Shore Site. The viewing site officially opens 24 hours prior to landing. Access to this site will be closed one hour prior to landing.

Normal access to Edwards Air Force Base will be restricted to official business only.

Viewers should follow news reports for any possible change in the landing date or location. Up-to-date landing information may be had by calling (8Ø5) 258-352Ø.

The East Shore Viewing Site offers an unobstructed view of the shuttle landing. Parking is on unprepared surfaces. Water and restrooms are available. Food and souvenir vendors are expected to be at the site.

Access to the viewing site is via secondary roads, and there may be congestion. There are two access routes to the East Shore Viewing Site.

Those traveling from the Los Angeles area should go north on the Antelope Valley Freeway (Highway 14), turn right (east) on the Avenue F off-ramp, then left (north) on Sierra Highway to Avenue E, right (east) on Avenue E to 14Øth Street, then left (north) on 14Øth to Avenue B, turn right (east) and Avenue B curves into Mercury Boulevard, which leads into the viewing area.

Those entering from Highway 58 should take the Rocket Site Road off-ramp to Mercury Boulevard, which leads into the viewing area.

-NASA Ames-Dryden-

March 3, 1989

NASA News
National Aeronautics and
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RELEASE NO. 89-4

FOR RELEASE: IMMEDIATE
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IN WASHINGTON, D.C.)

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Nancy Lovato
Ames-Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

NASA COMPLETES ADVANCED WING FLIGHT PROGRAM, PLANS SYMPOSIUM

NASA's Ames-Dryden Flight Research Facility, Edwards, California, has successfully completed flight tests of the Mission Adaptive Wing, flown on the Advanced Fighter Technology Integration F-111 aircraft.

For the Mission Adaptive Wing program, the F-111's wing was modified so that the curvature of the leading and trailing edges could be varied in flight. The airplane then could fly with optimum wing curvature for subsonic, transonic and supersonic speeds, offering the potential for greater flight efficiency.

Reductions in air drag from 8 to 20 percent were noted during the tests, as was a 20-percent reduction in wing bending during maneuvers. The airplane's handling qualities improved, with a significant delay in the onset of buffet around the wing.

During the final phase of the flight program, the wing system was evaluated in its automatic modes. Computer programs directed the system to adjust for optimum wing performance based on pilot inputs and other instrumentation information.

The Mission Adaptive Wing system performed reliably, with no in-flight failures during 144.9 flight hours. Four NASA and six Air Force test pilots flew the aircraft during the final phase for a total of 59 flights.

- more -

The prime objective of the program was to evaluate performance improvements created by the smooth, variable-camber Mission Adaptive Wing as compared to a fixed-camber wing.

"The performance of the wing showed improvements as predicted," says NASA Project Manager Louis L. Steers. "We'll be able to pass on our results to aircraft designers and the data should help with their future designs."

The program is a joint effort by NASA Ames-Dryden and the Air Force Wright Research and Development Center, Wright-Patterson Air Force Base, Ohio, with the Air Force Flight Test Center, Edwards Air Force Base, California, as a participating test organization. Boeing Advanced Systems, Seattle, Washington, built the Mission Adaptive Wing system.

NASA and the USAF Wright Research and Development Center will co-host a symposium to present program results on April 4-6, 1989, at the Ames-Dryden Flight Research Facility. Attendance at the symposium is limited to U.S. government agencies and their contractors. Those interested should contact Louis L. Steers, NASA Ames-Dryden Flight Research Facility, Edwards, California, 93523.

-NASA Ames-Dryden-

March 21, 1989

NASA News
National Aeronautics and
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RELEASE NO. 89-6

FOR RELEASE: IMMEDIATE
(ALSO RELEASED BY
NASA HEADQUARTERS,
WASHINGTON, D.C.)

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NASA PLANS F-16XL SUSTAINED-SUPERSONIC AIRFLOW RESEARCH TESTS

NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., has taken delivery of the first of two U.S. Air Force-loaned F-16XL aircraft for a NASA flight research program. The second aircraft will be delivered in several weeks.

The F-16XL aircraft is uniquely characterized by its large cranked-arrow wing, especially well suited for efficient supersonic flight. The aircraft will be used by NASA as testbeds to evaluate aerodynamic concepts designed to improve wing air-flow during sustained supersonic flight.

Current aircraft designs, both subsonic and supersonic, result in turbulent airflow over the wing, air drag and reduced aircraft fuel efficiency. An aircraft's fuel consumption can be significantly improved if this airflow over the wing is maintained in a laminar (non-turbulent) condition. NASA has established the feasibility of laminar flow control technology by designing and flying several experiments demonstrating laminar flow over parts of a wing at subsonic speeds.

The initial experiments with the F-16XL aircraft will focus on concepts to achieve significant amounts of laminar air flow on the wing at supersonic speeds. This information is expected to aid in the design of future high speed aircraft.

- more -

An experimental wing section will be installed which is perforated with thousands of tiny, laser-cut holes connected to an air pump mounted in the fuselage. The pump's suction will remove the turbulent layer of air next to the wing's surface, establishing laminar air flow. Instrumentation will acquire the flight data to validate the computer codes used to design the experiment and to quantify the experiment results.

- end -

April 10, 1989

NASA News
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RELEASE NO. 89-10

FOR RELEASE: IMMEDIATE
(ALSO RELEASED BY
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NASA FLIES FIRST AIRCRAFT SELF-DIAGNOSTICS SYSTEM

In the first flight in a joint NASA/USAF program that promises self-repairing flight controls and lower maintenance costs in future aircraft, computers aboard the NASA Ames-Dryden F-15 Flight Research Aircraft were able to correctly identify and isolate in flight a simulated failure in the flight control system.

Flight control system failures can and do occur during flight. When this happens, costly ground maintenance diagostic tests are conducted to try to identify the failure so that appropriate corrective actions may be taken. In many cases, the failure cannot be identified during ground tests because the actual flight conditions are not duplicated. With the new expert system technology, failures can be identified and isolated before landing and be fixed immediately.

The first simulated failure was an angle-of-attack sensor. The maintenance diagnostic system correctly identified the failure and isolated the problem. Future tests will incorporate other failures.

"This is a real breakthrough in flight control system maintenance diagnosis for future aircraft," says F-15 Flight Research Aircraft Project Manager Dr. James Stewart. "Newer digitally-controlled aircraft are more complex. However, digital controls allow this type of computer programming which will reduce the maintenance cost of future digitally-controlled aircraft."

- more -

The maintenance diagnostic system is the first technology to be tested in the Self-Repairing Flight Control Program. The other technologies, scheduled to begin flight tests this fall, include failure detection, identification and reconfiguration of the flight control system.

An example of the need for reconfiguration is when a tail surface fails in flight. The flight control system will be reconfigured (repair itself) so that other surfaces take over the function of the failed tail surface. Also, a pilot alert system will tell the pilot what the problem is and what the new configuration and flight envelope are after the system has self repaired.

This program is being conducted by NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., and is sponsored by the Air Force Wright Research and Development Center, Wright-Patterson Air Force Base, Ohio. The prime contractor, McDonnell Aircraft Company, St. Louis, Mo., with the General Electric Aircraft Control System Division, Binghampton, N.Y., designed and developed the maintenance diagnostic system for use in the NASA program.

- end -

May 5, 1989

NASA News

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P.O. Box 273
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AC 805 258-8381

RELEASE NO. 89-11

FOR RELEASE: IMMEDIATE
(ALSO RELEASED BY
NASA HEADQUARTERS,
WASHINGTON, D.C.)

Nancy Lovato
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(Phone: 805/258-8381)

Mary Sandy
Headquarters, Washington, D.C.
Phone: 202/453-2754)

EDITORS NOTE: FLIGHTS SET FOR SECOND X-29 RESEARCH AIRCRAFT

NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., is presently planning the first and second flights of the second forward-swept-wing X-29 research aircraft for mid to late May 1989. The first aircaft completed its flight program in December 1988.

The second X-29 is to be flown in a new, high angle-of-attack research program. The airplane is identical to the first X-29, except for some instrumentation changes and a spin parachute for emergency spin recovery.

The first flight will be a functional check flight to verify that all the aircraft systems are working properly. During the second flight, scheduled for about 10 days after the first, the spin recovery parachute will be deployed in flight. At the controls for the first flight will be NASA X-29 chief project pilot Stephen D. Ishmael.

Media wishing to cover either flight should contact Nancy Lovato, NASA Ames-Dryden Public Affairs, at 805/258-3449. Video tapes of each flights will be available later the same day.

- end -

May 9, 1989

NASA News
National Aeronautics and
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RELEASE NO. 89-12

FOR RELEASE: IMMEDIATE
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WASHINGTON, D.C.)

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NASA TO TEST SPACE SHUTTLE LANDING GEAR

Extensive tests of Space Shuttle orbiter landing gear assemblies, from normal conditions up to and including failure modes, will be conducted by NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., using a CV-990 aircraft. Planning and modifications to the CV-990 begin this year, with flight tests scheduled for 1990.

Data from the tests will give engineers information on what to expect should an orbiter experience a flat tire or other anomalies on landing and will provide data to help in developing crew procedures for various landing conditions and situations.

"During most of reentry and landing, the Space Shuttle becomes an airplane," says Ames-Dryden Project Manager Robert S. Baron. "By testing on actual landing surfaces, we can provide real-world experience for accurate simulations so that the astronauts will know better what to expect in any situation."

The tests are part of a continuing effort by NASA's Johnson Space Center to upgrade and enhance Space Shuttle landing capabilities. Officials at Ames-Dryden also hope to use the CV-990 as a testbed for future landing systems tests.

In addition to assessing and documenting performance of main and nose landing gear assemblies and tire and wheel assemblies, tests will evaluate brake and nose gear steering performance.

- more -

During the program, tests will be conducted on lakebed and concrete runways at Edwards, on the concrete Kennedy Space Center runways and on lakebed runways at White Sands Space Harbor.

The CV-990 will retain its normal gear. The orbiter landing gear will be installed so that it can be lowered hydraulically when the aircraft first contacts the landing surface.

The test gear assembly will be mounted on the CV-990's fuselage between the main tires, and a hole will be cut in the fuselage to accommodate raising and lowering the gear. The underside of the fuselage will be armor-plated to protect the aircraft from any possible damage.

High-speed video and film cameras, in addition to other instrumentation, will record the tests for thorough analysis. Landing speeds of the CV-990 will duplicate those of the orbiter, approximately 225 miles per hour.

Ames-Dryden project pilot for the landing gear tests is C. Gordon Fullerton, a veteran of two Space Shuttle flights.

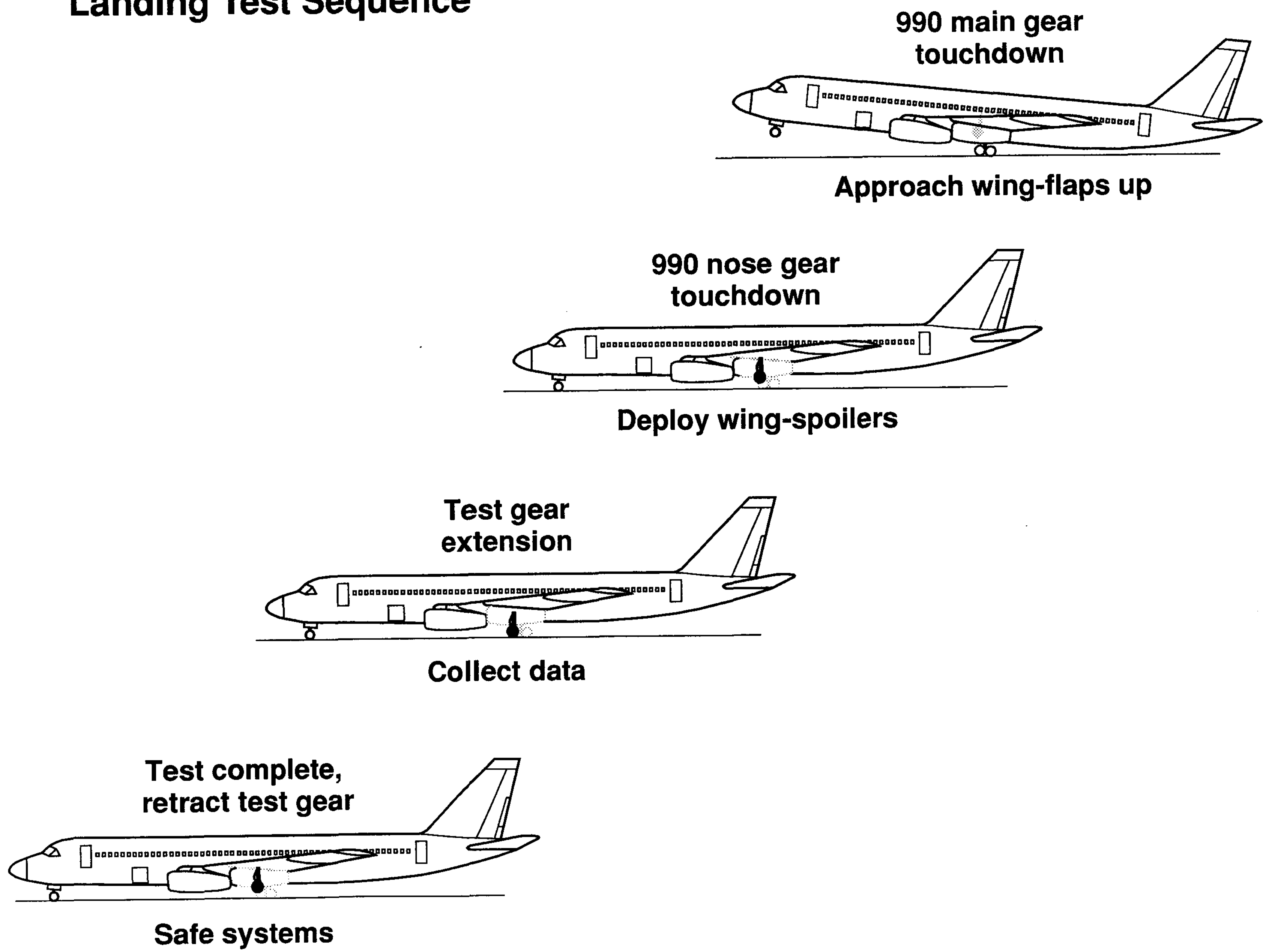
Other organizations involved in these tests are the NASA Langley Research Center's Landing Impact Dynamics Facility, Hampton, Va.; Wright-Patterson Air Force Base's Landing Gear Development Facility, Dayton, Ohio; the B.F. Goodrich Facility, Troy, Ohio; and Rockwell International's Space Transportation Systems Division, Downey, Calif.

- end -

May 15, 1989

Note To Editors: Attached artwork shows landing test sequence for the CV-990 shuttle testbed aircraft.

CV-990 Shuttle Testbed Aircraft
Landing Test Sequence



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RELEASE NO. 89-14

FOR RELEASE: IMMEDIATE
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NASA HEADQUARTERS,
WASHINGTON, D.C.)

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NASA CELEBRATES FLIGHT OF FIRST HYPERSONIC RESEARCH AIRCRAFT

Thirty years ago on June 8, 1959, NASA's famed rocket-powered X-15 knifed through the clear desert sky over California to become the world's first hypersonic research aircraft, eventually flying at over six times the speed of sound.

North American Aviation pilot A. Scott Crossfield was at the controls for the first flight. X-15s flew until Oct. 24, 1968, when NASA's William H. Dana, now chief test pilot at Ames-Dryden, made the last flight of the program.

The three X-15 research aircraft flew a total of 199 flights in what is widely regarded as one of the most successful aeronautical research programs ever conducted. The X-15 flew to altitudes in excess of 67 miles, making it the first "spaceplane."

The X-15 was developed to provide research data on aero-thermodynamics, aerodynamics, structures, flight controls and the physiological aspects of high-speed, high-altitude flight. While the original design goal was 4,000 miles per hour, 4,520 miles per hour was achieved. The highest altitude flown -- 354,200 feet -- far exceeded the original goal of 250,000 feet.

Since the X-15 flew to the edge of space, researchers were able to fly many experiments on a repeated basis that aided in developing space technology. The capabilities and limitations of the human pilot in flying space trajectories and reentry maneuvers were thoroughly explored.

- more -

Over 700 technical documents were created through the course of the program, greatly increasing information available to the then-blossoming space industry. Based on the success of the X-15 design, development and flight program, the Mercury, Gemini and Apollo spaceflight programs were accelerated.

"The result of the focusing and stimulating effects of the program was to generate aerospace vehicle technology at a highly accelerated rate compared to the more leisurely rate that existed prior to the X-15," said X-15 program official John V. Becker of NASA's Langley Research Center, Hampton, Va. "Thus when it became clear that the Space Age was upon us and the need to put a human into Earth orbit became a matter of national urgency, a massive backlog of aerospace technology was already at hand in the X-15 program."

Twelve military and civilian test pilots flew the aircraft during the joint NASA-USAF-Navy program. Of the twelve, Neil A. Armstrong went on to become the first man to set foot on the moon, and Joe H. Engle flew the Space Shuttle. Three pilots are deceased.

Officials at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., are planning a technical symposium on June 8 to mark the anniversary, which includes a panel of former X-15 pilots.

Eight former X-15 pilots presently are confirmed to participate in the pilots panel that will discuss various aspects of the flight program. These include A. Scott Crossfield, presently a technical consultant to the Science, Space and Technology Committee, U.S. House of Representatives; Joe H. Engle, USAF retired; Robert M. White, USAF retired; Forrest S. Petersen, USN retired; Robert A. Rushworth, USAF retired; Milton O. Thompson, currently chief engineer at Ames-Dryden; William J. Knight, USAF retired and currently mayor of Palmdale, Calif.; and Dana. They will be joined by X-15-era Dryden director Paul Bikle, now retired.

- end -

May 30, 1989

Note to Editors: Media wishing to cover either the X-15 pilot's panel or technical symposium should contact Nancy Lovato, NASA Ames-Dryden Public Affairs at (805) 258-3449. An X-15 video clip and photograph are available from NASA Headquarters, (202) 453-8375.

Photograph:	B&W	Color
	89-H-325	89-HC-345

NASA News

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RELEASE NO. 89-15

FOR RELEASE: IMMEDIATE
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EDITORS NOTE: STS-28 NEWS MEDIA ACCREDITATION

NASA is accepting accreditation requests for news media to cover the Space Shuttle Columbia mission (STS-28), currently targeted for launch in late July.

All news organizations wishing to send representatives to cover STS-28 must send a letter requesting accreditation for the mission. Previous requests for credentials do not apply to subquent missions and new letters must be submitted.

Requests for credentials, launch through landing, should be submitted to:

NASA John F. Kennedy Space Center
PA-PIB/Accreditation
Kennedy Space Center, FL 32899

Please indicate the NASA location(s) from which you plan to cover the mission. Media planning to cover the landing only should submit their requests for accreditation to:

NASA Ames-Dryden Flight Research Facility
Attn: DXI/Public Affairs
P.O. Box 273
Edwards, CA 93523

- more -

Requests for accreditation must be made by a supervisory official other than the applicant on company letterhead, clearly indicating the assignment (reporter, photographer, technician, etc.) and social security number of each individual. Freelance writers and photographers must offer proof of assignment or evidence of past professional activity. The accreditation will be valid for all NASA news centers.

NASA ground rules for newspersons covering the mission are:

- NASA can make no travel or housing arrangments.

- Only working newspersons will be accredited at the news centers. Publishers and other news and advertising executives will not be accredited. These individuals should apply to NASA Public Services Division (LP), NASA Headquarters, Washington, D.C., 20546.

- Friends, dependents or relatives not covering the mission will not be accommodated.

- No one under 16 years of age will be allowed at the press site under any circumstances. Violation of this rule will result in cancellation of press site privileges for responsible parties.

- Philatelic publications must meet the criteria for general publications or be national publications of recognized philatelic organizations. Representatives of catalogs, newsletters, local clubs or profit seeking projects will not be accredited. Conducting philatelic business, other than reporting, is not permitted.

- College news media are limited to two accredited correspondents.

- You must present your letter of acceptance and a photo identification to obtain a news media badge at the appropriate center.

- Violations of the rules will result in loss of press badge and press site privileges.

- end -

June 13, 1989

NASA News

National Aeronautics and
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RELEASE NO. 90-4 February 12, 1990

Nancy Lovato
(805) 258-8381

VIEWING AREA NOT AVAILABLE FOR SHUTTLE LANDING

Space Shuttle Mission STS-36 is now scheduled for launch on Feb. 22. Landing is planned for Edwards Air Force Base, Calif., however, since the flight is a classified Department of Defense mission no viewing site will be available.

Access to Edwards Air Force Base will be restricted to official business only during landing operations. There will be no guest access nor will usual NASA tours be held during that period.

NASA officials expect the East Shore Viewing Site to be open for the following Space Shuttle mission, STS-31, now scheduled for an Edwards landing in April 1990.

-NASA Ames-Dryden-

NASA News

National Aeronautics and
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February 14, 1990
For Immediate Release
(Simultaneously released
in Washington, D.C.)

RELEASE: 90-5

NASA ACQUIRES SUPERSONIC SR-71s ON LOAN FROM USAF

Three supersonic SR-71 "Blackbird" aircraft, being retired from the U.S. Air Force, are slated for loan to NASA's Ames-Dryden Flight Research Facility, Edwards, Calif. One airplane is scheduled for arrival on Feb. 15, with the second arriving Feb. 20. Arrangements for the third aircraft will be determined later.

The aircraft will be in flyable storage at the NASA facility until the Air Force determines that it no longer has a need to preserve them. NASA officials currently are assessing research opportunities and experimentation that can benefit from using these high-speed flying testbeds. A loan agreement between NASA and the Air Force for these aircraft is in preparation.

-more-

The Dryden facility operated YF-12s, similar to SR-71s, from 1969 to 1979, gaining much useful research data on structures and stability and control of airbreathing aircraft at high speeds and altitudes.

The SR-71, manufactured by Lockheed Corp., is capable of flying at greater than three times the speed of sound. The aircraft's 101-foot long titanium structure is coated with a special black paint that helps dissipate heat caused by high speeds.

-end-

Editors Note: Media wishing to photograph the arrival of the SR-71 on Feb. 15 or Feb. 20 should contact NASA Dryden Public Affairs at 805/258-3449 no later than 3 p.m. PST the day prior. NASA project official David Lux will be available for questions. Still photographs and videotape of arrivals will be available from NASA Dryden Public Affairs.

NASA News

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March 23, 1990
For Immediate Release
(Simultaneously released
in Washington, D.C.)

RELEASE: 90-7

NASA F-15 DEMONSTRATES SELF-REPAIRING FLIGHT CONTROL SYSTEM

NASA research pilots have successfully tested a flight control system that detects in-flight failures and automatically reconfigures an aircraft's ailerons, rudders and elevators, allowing pilots to continue their missions or land safely.

The self-repairing flight control system, first system of its type in the aerospace industry, has been demonstrated on NASA's F-15 Highly Integrated Digital Electronic Control research aircraft based at Ames-Dryden Flight Research Facility, Edwards, Calif.

The primary purpose of the system is to detect damaged flight control components and adjust undamaged flight surfaces so the pilot can maintain good aircraft response. When the system senses a failure, it selects the best pre-computed solution from a set of control laws loaded into the F-15's computer. The system also can constantly monitor subsystems throughout the aircraft to diagnose and identify failures that are hard to repeat and isolate during post-flight maintenance.

"This is a very significant and far reaching development in aviation," said James F. Stewart, project manager of the F-15 research program at Ames-Dryden. "Once it is fully developed and operational, the self-repairing flight control concept could greatly increase tactical aircraft survivability in combat and enhance safety during training missions. It also has the potential for adaptation to civil aircraft, enhancing aircraft and passenger safety."

- more -

On the initial self-repairing system demonstration flight, NASA research pilot James Smolka, flying at Mach 0.7, purposely locked the F-15's right horizontal stabilator to represent a failure of hydraulic or electronic systems. The self-repairing system instantly reconfigured the remaining stabilator, ailerons and rudder to establish aircraft pitch and roll control with the right stabilator remaining in the "failed" state.

A battle damage scenario in which control effectiveness of the right stabilator was changed to simulate flight with 80 percent of the span missing was then demonstrated. The system correctly identified the "damage" and reset the other flying surfaces to restore normal controlled flight.

During self-repairing system activation, the pilot receives a preprogrammed visual warning on the cockpit heads up display that explains the type of system failure. This alert readout gives the pilot new flight limits such as reduced speed or maneuvering loads that the failure or battle damage may impose.

The maintenance diagnostic capability of the self-repairing system was demonstrated by five types of failures programmed into the F-15 research aircraft's flight computer. Each was selectable by the pilot and set to activate only under specified maneuver conditions. The system was able to identify all five intermittent electrical, mechanical and hydraulic faults. After the F-15 aircraft returned to Ames-Dryden, the failure data and appropriate repair instructions were displayed on a ground station screen that would have facilitated repair work to return the plane to 100 percent flight status.

An advanced self-repairing system is expected to be developed and thoroughly tested before the technology is used in future aircraft designs or retrofitted on existing aircraft. The operational envelope of such an advanced system may include landing tasks, supersonic speeds and flight in automatic terrain-avoidance and terrain-following modes.

Feasibility studies on the system began in 1984 at the Air Force's Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio. Ground-based and in-flight simulators verified the data before development of the system demonstrated on NASA's F-15 research aircraft.

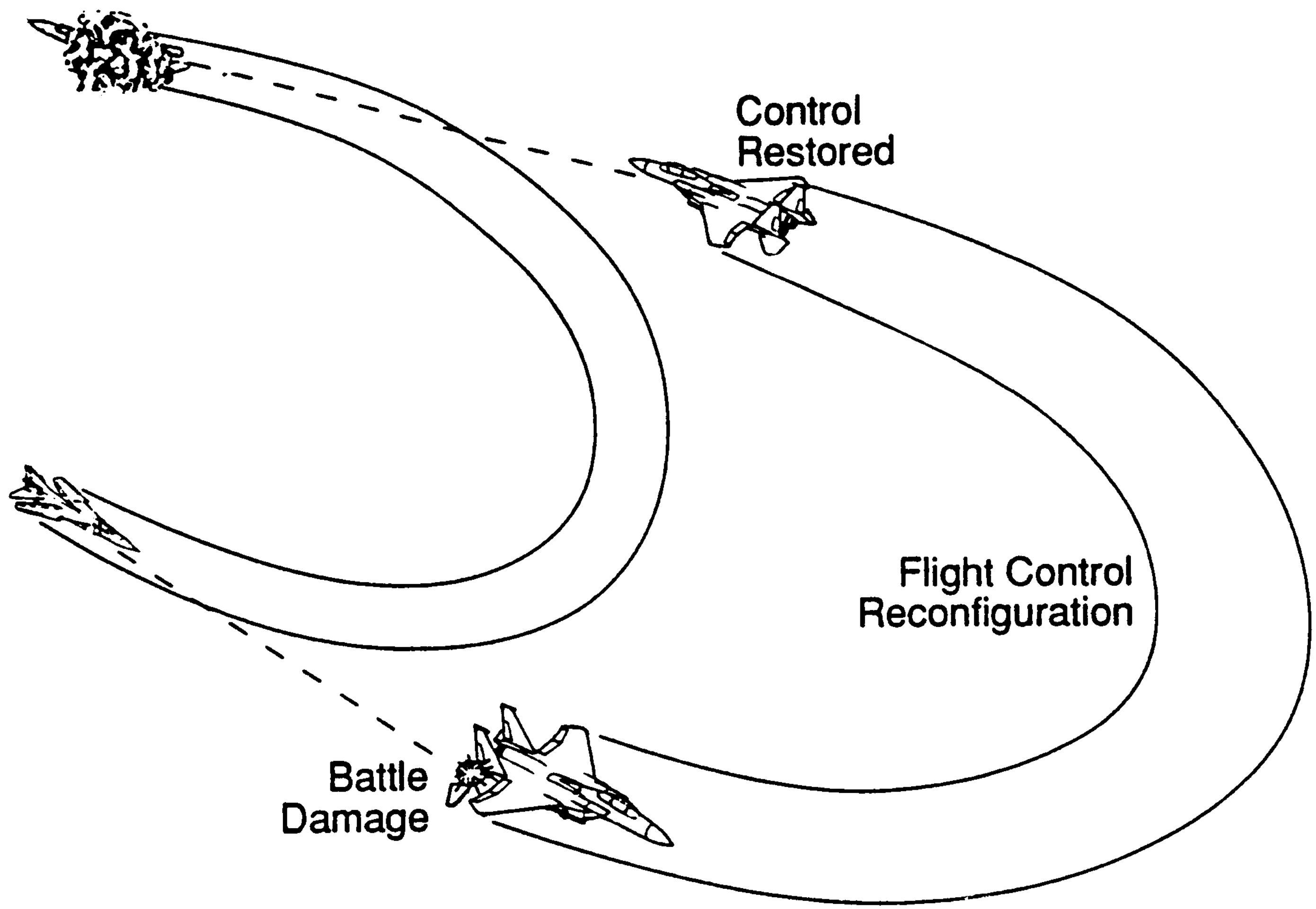
Besides James Smolka, other NASA pilots taking part in the system development have been Tom McMurtry, chief of Ames-Dryden's Aircraft Operations Division and Ames-Dryden chief test pilot Bill Dana.

McDonnell Aircraft Co., St. Louis, and General Electric's Aircraft Control Division, Binghamton, N.Y., developed the self-repairing system under contract to NASA's Ames-Dryden facility.

The U.S. Air Force Wright Research and Development Center, Wright-Patterson AFB, Ohio, sponsors the program.

- end -

NASA news releases and other information are available electronically on CompuServe and GEnie, the General Electric Network for Information Exchange. For information on CompuServe, call 1-800/848-8199 and ask for representative 176. For information on GEnie, call 1-800/638-9636.



DRAWING SHOWS HOW THE SELF-REPAIRING FLIGHT CONTROL SYSTEM CAN PRESERVE MANEUVERING CAPABILITY OF A DAMAGED MILITARY AIRCRAFT

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IN WASHINGTON, DC)

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NOTE TO EDITORS:

B-52/PEGASUS LAUNCH SCHEDULED FOR APRIL 4

First mission of the Pegasus air-launched space booster is now scheduled for April 4. Pegasus will be launched from underneath the wing of a B-52 aircraft operated by NASA's Ames-Dryden Flight Research Facility, Edwards, Calif.

Pegasus is a three-stage space launch vehicle designed to deliver small payloads into low Earth orbit. Payloads for the first mission include PEGSAT, which carries instrumentation, a small satellite and barium chemical release experiments.

The Pegasus program is sponsored by the Department of Defense Advanced Research Projects Agency. Pegasus was developed by Orbital Sciences Corp., Fairfax, Va., and Hercules Aerospace Co., Wilmington, Del.

-more-

Launch will take place about 60 miles southwest of Monterey, over the Pacific Ocean. The event will be carried live on NASA Select television, Satcom F-2R, transponder 13.

There will be a post-mission press briefing, also carried on NASA Select, at the Ames-Dryden facility. Media will be able to photograph takeoff of the B-52/Pegasus. Takeoff time is planned for 11 a.m. PDT, with launch at about 12:10 p.m. PDT.

Media wishing to cover the mission should contact the Ames-Dryden Public Affairs Office, 805/258-8381, no later than April 2. Media who plan to photograph takeoff must be at the Dryden News Center no later than 9:45 a.m. PDT on launch day.

- end -

NASA News

National Aeronautics and
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For Release:
March 27, 1990

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N90-18

NOTE TO EDITORS:

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- end -

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April 9, 1990

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RELEASE: 90-10

X-29 SHOWS UNEXPECTED MANEUVERABILITY IN "HIGH-ALPHA" FLIGHT

The X-29 research aircraft is demonstrating in flight much better control and maneuvering qualities at high angles of attack than wind tunnel tests, computational methods and simulation models predicted.

The X-29 is an advanced technology demonstrator aircraft based at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif. The current flights, using the second of two X-29s, are investigating high angle-of-attack characteristics and military utility of the aircraft's unique forward-swept-wing/canard configuration as part of a joint NASA-Air Force program.

-more-

Angle of attack is an engineering term that describes the angle of an aircraft's body and wings relative to its actual flight path. At extreme angles of attack, also called "high alpha," the airflow around an aircraft can produce conditions in which the wings do not create enough lift to maintain altitude.

According to Steve Ishmael, one of NASA's X-29 project pilots, the aircraft's excellent control response in the 25-45 degree angle of attack range was unexpected.

"We have much more control than we thought we would have at these angles," said Ishmael. "We have good roll control and we have modest yaw control. We didn't expect this."

X-29 project officials do not yet fully comprehend why the plane responds so well in the high alpha regime. Possible explanations include interaction of the canards with vortices of air coming off the nose or some unexpected effect of the plane's forward-swept wings.

"This maneuvering capability is really a bonus for us, but we don't fully understand what is causing it," explained Gary Trippensee, X-29 project manager at Ames-Dryden. "It's something we're really looking forward to exploring."

The second X-29 reached a 50-degree angle of attack on its 23rd flight in the current research phase of the technology demonstrator program. The aircraft achieves its high alpha controllability without leading edge flaps on the wings for additional lift. It also doesn't have movable vanes on its engines to change or "vector" the direction of thrust, a capability that enhances stability and control at high Alpha.

The first X-29, which first flew in December 1984, investigated design, manufacturing and flight control concepts that have potential for development in future aircraft. It was flown 242 times, the most for any of Ames-Dryden's X-aircraft at Ames-Dryden, before it was removed from flight status.

The X-29 technology demonstrator program, funded initially by the Department of Defense Advanced Research Project Agency, is managed by the Air Force's Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio. Pilots who have flown the X-29 in the current research project are Steve Ishmael and Rogers Smith (NASA), Majors Al Hoover and Dana Purifoy (USAF), and Grumman test pilot Rod Womer.

- end -

NOTE TO EDITORS: A photograph is available to illustrate this release by calling (805) 258-3456

Color: EC90 0048 006

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RELEASE: 90-11

NASA F-16XL AIRCRAFT LAMINAR FLOW STUDIES SET TO BEGIN

Flight testing of the first experimental wing surface designed to improve laminar (smooth) airflow at supersonic speeds will begin this month at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif.

The flights with a specially-modified F-16XL aircraft are part of an effort to improve high-speed performance by reducing aerodynamic drag. Current aircraft designs, both subsonic and supersonic, have turbulent airflow over a major portion of their wings. This turbulence decreases performance and reduces fuel efficiency. Good laminar flow occurs when the turbulent layers of air flowing over an aircraft wing in flight are minimized.

-more-

A thin experimental wing section containing an active suction system has been placed on the upper surface of the F-16XL's wing. Designed by Rockwell International, North American Aircraft, El Segundo, Calif., the "glove," as it's commonly called, is intended to siphon-off a portion of the layer of turbulent surface air through millions of tiny laser-cut holes in the experimental section's titanium skin and provide a greater area of smooth airflow over that section of the wing.

Researchers expect the instrumentation monitoring airflow over the experimental wing section to produce data that will validate computer codes and aid in the design of future high-speed civil transports and high-performance military aircraft.

The F-16XL is on loan to NASA from the U.S. Air Force. It is capable of flying more than 1,200 mph -- twice the speed of sound. The aircraft's delta-wing design and sustained supersonic capability make it an excellent testbed for the laminar flow studies.

The glove covers about 40 percent of the upper surface of the F-16XL's left wing and about 50 percent of the wing's leading edge. A layer of foam, up to 2 inches thick in some places and covered with fiberglass, is used as a fairing to blend the glove with the aircraft's original upper wing surface.

-more-

NASA research pilot Steve Ishmael will make about 20 flights over the next 3 months to evaluate the laminar flow wing section at supersonic speeds.

According to Louis L. Steers, manager of the F-16XL project at Ames-Dryden, NASA also plans subsequent laminar flow studies. In this second phase, the aircraft's wing will be modified with a different type of experimental wing surface designed by NASA's Langley Research Center, Hampton, Va. Initial flights in the second phase will be without a suction system. Later, a suction system will be added to the leading edge and other wing surfaces.

The first phase of the F-16XL laminar flow research project is being carried out under a cooperative agreement between NASA and Rockwell International.

\- end -

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RELEASE: 90-12

NASA/USAF X-29 RESEARCH AIRCRAFT SET FOR PUBLIC VIEWING

The NASA/USAF X-29 forward-swept-wing research aircraft is scheduled for its first public display away from its Southern California base at two major air shows in July.

The X-29's first appearance will be at the Dayton, Ohio, air show from July 19-22. Subsequently, the aircraft will be displayed at the Experimental Aircraft Association's International Convention and Sports Aviation Exhibition, Oshkosh, Wis., July 27-Aug. 2.

The airplane is the first of two X-29s built to obtain flight information on the unusual wing design and various other technologies, including the extensive use of lightweight, composite materials in the wing's construction. Flight testing has proved that the forward-swept-wing design is practical.

- more -

There will be no aerial demonstration of the X-29 at either air show. NASA and Air Force personnel will be available at the display sites to answer questions.

During its 4-year flight test program, the first X-29 flew 242 missions -- a record number for an X-series high-performance aircraft. It has been in storage since December 1988. The second X-29 is continuing to gather data in a high angle-of-attack flight research program.

The joint NASA/USAF program is managed by NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., and the Wright Research and Development Center, Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio. The Defense Advanced Research Projects Agency sponsored development of the X-29. Grumman Aircraft Corp., Bethpage, N.Y., manufactured the two aircraft.

Stephen D. Ishmael, Ames-Dryden Chief X-29 Research Pilot, will fly the aircraft to Dayton and Oshkosh. Other pilots currently flying the X-29 are NASA's Rogers E. Smith, Grumman's Rod Womer and Air Force Major Dana D. Purifoy.

The X-29 is 48-feet long with a 27-foot wingspan and is powered by a single General Electric F404-GE-400 engine. Its paint scheme, white with a broad accent stripe of dark blue on

- more -

its fuselage and wings outlined in red, emphasizes the plane's unique wing configuration.

- end -

NOTE TO EDITORS: A photograph is available to media representatives to illustrate this release by calling 805/258-3449.

Color: EC 90 101-2

NASA News
National Aeronautics and
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Headquarters, Washington, D.C.
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July 18, 1990
(Simultaneously released
in Washington, D.C.)

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RELEASE: 90-15

SPACE SHUTTLE DRAG CHUTE TESTS SET TO BEGIN AT AMES-DRYDEN

Tests of a drag parachute system to improve the landing capabilities of Space Shuttle orbiters are expected to begin this month at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif.

The tests are part of NASA's continuing program to upgrade operational capabilities and flight safety of the Space Shuttle fleet.

Drag chutes are specially designed parachutes deployed from the aft end of an aircraft or aerospace vehicle to supplement the normal system of brakes and help slow the vehicle's speed after it has landed on a runway. Drag chutes on the orbiters will

-more-

permit them to land safely in a shorter distance and also help reduce tire and brake wear.

The drag chute tests will be conducted on the same B-52 that Ames-Dryden uses as a "mothership" to take manned and unmanned aircraft to altitudes of up to 40,000 feet where they are air-launched and their research flights begin.

The orbiter drag chute is four feet smaller in diameter than the normal B-52 chute. For these tests, a modified orbiter drag chute compartment has been mounted on the B-52. This results in a difference in the load path of the parachute loads on the aircraft. To handle the new loads, NASA has strengthened the tail section of the B-52 where the drag chute deployment system is located.

Instrumentation will record loads at various locations in the attachment system and aft-facing cameras will film the deployment of the drag chute during the tests. Data obtained from the tests will be used to validate predicted loads for an operational orbiter.

Eight landing tests with the orbiter chute system are planned at Ames-Dryden with chute deployment at speeds ranging from 140 to 200 knots (160 to 230 mph). Orbiter landing speeds range from 180 to 225 knots (210 to 260 mph).

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The B-52 is restricted to a top landing speed of 200 knots in the tests because of tire limitations.

Endeavour, the orbiter being built by Rockwell International, Palmdale, Calif., is expected to become the first Space Shuttle with a built-in drag chute deployment system when it is rolled out of the assembly plant next year. The system will be installed on the three orbiters now in use -- Discovery, Atlantis and Columbia -- as part of the program to continually upgrade and improve the reusable spacecraft.

Piloting the B-52 during the tests will be C. Gordon Fullerton, a former astronaut who flew on two Space Shuttle missions. Fullerton, now a research pilot at Ames-Dryden, was also a member of the NASA flight crews that carried out the Space Shuttle approach and landing tests at Ames-Dryden in 1977 with the prototype orbiter Enterprise.

The NASA B-52 test aircraft, built in 1952, is the oldest B-52 in flying status and also the oldest research aircraft flown by NASA. It was used as the launch aircraft on most of the X-15 research flights in the 1960s and lifting body missions in the 1970s and early 1980s. It was most recently the launch aircraft for the first successful test of the commercially developed Pegasus air-launched space booster.

The orbiter drag chute test program is managed by NASA's Johnson Space Center, Houston. Also participating in the program are Rockwell International, which designed the orbiter drag chute system; Irvin Industries, Santa Ana, Calif., which designed the parachute; and the Boeing Airplane Co., Seattle, which designed the modifications to the B-52 test aircraft.

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July 18, 1990

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RELEASE: 90-100

SPACE SHUTTLE DRAG CHUTE TESTS SET TO BEGIN AT AMES-DRYDEN

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The tests are part of NASA's continuing program to upgrade operational capabilities and flight safety of the Space Shuttle fleet.

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October 4, 1990

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RELEASE: 90-20

NASA TO CONDUCT THRUST VECTORING RESEARCH FLIGHT

An upcoming series of research flights with an F/A-18 aircraft at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., may make it easier to control future jet fighters at very high angles-of-attack. Angle-of-attack or "alpha" is an engineering term for the angle of an aircraft's body and wings relative to its actual flight path.

A set of spoon-shaped paddles has been installed around the exhaust nozzles of the research aircraft's two engines. The paddles can be moved, much like the rudder on a boat, to deflect or vector engine thrust in different directions, giving the plane better controllability at nose-high attitudes up to 70 degrees.

Each paddle, made of Inconel steel and able to withstand nearly 2,000 degrees F., rotates 25 degrees into the engine exhaust stream to vector the thrust. When not in use, the paddles are positioned out of the exhaust streams where they will not interfere with normal engine operations. The aircraft's flight control system governs the location of the paddles using special research software developed for the thrust vectoring studies.

The flights are part of a continuing NASA program to help aircraft designers increase the maneuverability and safety of future high-performance aircraft at high angles-of-attack. When angle-of-attack increases during tight turns and maneuvers, an aircraft's control surfaces may not generate enough lift for the pilot to maintain aircraft stability and control.

The vectored thrust modification to NASA's F/A-18 High-Alpha Research Vehicle will let Ames-Dryden pilots obtain data about the behavior of air over the aircraft's body and wings at higher angles-of-attack than previously attempted in the research program. Earlier flights took the same aircraft to a 55-degree angle-of-attack without using thrust vectoring.

The first checkout flight following installation and ground testing of the thrust vectoring system is scheduled for

November. Research flights with the new system operating will begin early in 1991 and should continue through most of 1993.

NASA program officials stress that the thrust vectoring system is designed solely to provide test capabilities for low-speed high-alpha research and is not a prototype or a production model being tested for operational use on the F/A-18 or any other aircraft. Results of the aerodynamic studies will be used to validate computer predictions and wind tunnel results. The unique flight control system also will be used to investigate new flight control laws for high angle-of-attack maneuvering.

Flights with vectored thrust are the second phase of NASA's three-part high-alpha program. The first phase, using the F/A-18's conventional flight control system, ended late last year after 101 flights.

A planned third phase would use narrow hinged strakes at the aircraft's nose as another way to obtain yaw (left and right) control at high angles-of-attack. The wing-like strakes, folded down along the side of the fuselage when not in use, would be raised on one side or the other to interact with strong vortices of air generated by the nose to produce side forces to move the nose left or right.

The F/A-18 flights are part of an integrated high angle-of-attack research and technology program jointly conducted by NASA's Langley Research Center, Hampton, Va., Ames Research Center, Mountain View, Calif., and Lewis Research Center, Cleveland. The Ames-Dryden high-alpha project pilot is Edward R. Schneider.

The thrust vectoring system and control laws were designed and built by McDonnell Aircraft Co., St. Louis. The software and hardware for the flight control system was developed by General Electric Corporation's Aircraft Control System Division, Binghamton, N.Y.

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Release No. 90-22 Nov. 28, 1990

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VIEWING AREA AVAILABLE FOR SHUTTLE LANDING

The East Shore Viewing Site at Edwards Air Force Base, Calif., will be available for viewers wishing to observe the landing of the Space Shuttle Columbia, mission STS-35. Landing time is planned for approximately 8:26 p.m. PST on Dec. 11, according to officials at NASA's Dryden Flight Research Facility at Edwards.

Since the landing is in darkness and the Shuttle is not equipped with running lights, very little will be visible to potential viewers. Nighttime temperatures at the Mojave desert landing site have been in the 25 to 35 degree Fahrenheit range.

Vehicle passes are not required for the East Shore Viewing Site. The site opens 24 hours prior to landing. Access to this site will be closed one hour prior to landing.

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2-2-2-2 Shuttle Landing Viewing

Viewers should follow news reports for any possible change in the landing date or location. Up-to-date landing information may be had by calling (805) 258-3520.

Parking in the East Shore Site is on unprepared surfaces. Water and restrooms are available.

Access to the viewing site is via secondary roads, and there may be congestion. There are two access routes to the East Shore.

Those traveling from the Los Angeles area should go north on the Antelope Valley Freeway (Highway 14), turn right (east) on the Avenue F off-ramp, then left (north) on Sierra Highway to Avenue E, right (east) on Avenue E to 140th Street, then left (north) on 140th to Avenue B, turn right (east) and Avenue B curves into Mercury Boulevard, which leads into the viewing area.

Those entering from Highway 58 should take the Rocket Site exit. Rocket Site Road becomes Rich Road. From Rich Road, make a right turn onto Mercury Boulevard and into the viewing site.

-NASA Ames-Dryden-

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Nov. 5, 1990

Release: 90-23

NEW AMES DEPUTY DIRECTOR TO HEAD AMES-DRYDEN

Arnold D. Aldrich, NASA Associate Administrator for Aeronautics, Exploration and Technology, today announced an organizational change at NASA's Ames Research Center, Mountain View and Edwards, Calif., designed to reinforce and strengthen national flight research capabilities at the Ames-Dryden Flight Research Facility, Edwards. A new Ames-Dryden deputy center director position will be located at Dryden, and will serve also as the director of the Dryden facility.

In announcing the change Aldrich said, "This updated management structure at Ames will take advantage of Ames' institutional capability to conduct research along a full continuum, ranging from computation through validation flight test. It simultaneously will provide enhanced recognition for the unique capabilities of Dryden for conceiving and executing national flight-test programs."

Kenneth J. Szalai has been selected as the Ames Deputy Director who, under the new Ames' management organization, will be located at Dryden and will direct Dryden's research and operations, effective Dec. 3, 1990. The appointment was announced today by Dr. Dale Compton, Ames Director.

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"This appointment recognizes the importance of flight research to the nation's aeronautics program and underscores Dryden's importance as a national asset for conducting this research," said Compton. "Szalai is an internationally recognized expert on flight control and flight systems and has extensive experience with flight research. He is particularly well qualified to take this leadership position."

Martin A. Knutson, Director of the Flight Operations and Research Directorate, will return to the Ames Mountain View site to direct flight operations there. "Knutson has done an excellent job at Dryden and the additional experience he has gained will add to the already close coordination between the two sites," Compton said.

Szalai, 48, previously served as Chief of the Research Engineering Division at Dryden. He joined NASA in 1964 and held various research and systems engineering positions of increasing responsibility before moving into management as a branch chief. He also was principal investigator on the first digital fly-by-wire aircraft.

Szalai has authored over 25 technical papers and reports. He is a fellow of the American Institute of Aeronautics and Astronautics (AIAA). Szalai has received numerous awards including the NASA Exceptional Service Medal, the NASA Outstanding Leadership Medal, and the Presidential Rank of Meritorious Executive.

Szalai received a bachelor's degree in electrical engineering from the University of Wisconsin in 1964 and a master's degree in mechanical engineering from the University of Southern California in 1970.

He and his wife reside in Lancaster, Calif., with their three children.

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NASA News

ISY

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For Release May 10, 1993

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RELEASE: 93-81

WORLD'S LARGEST WIND TUNNEL WILL BE WORLD'S QUIETEST

The world's largest wind tunnel soon will be the world's quietest, thanks to a $25 million NASA sound insulation project.

NASA will design and install an acoustic lining in the 40-by-80-foot test section of the National Full-scale Aerodynamics Complex (NFAC) at NASA's Ames Research Center, Mountain View, Calif. The improved wind tunnel ultimately will help U.S. industry design quieter engines for a future high-speed civil transport and for new, advanced helicopters.

"It will provide the United States with a world-class capability that will help us greatly during the next generation of aeronautical research," said Ames Project Manager John Allmen. "After workers install the acoustic lining, echoes will be greatly reduced. Microphones will be able to measure engine and rotor sounds much more accurately with fewer sound waves bouncing off the walls."

Background noise and echoes in the wind tunnel test section cause problems for measuring sound during engine tests. The deeper the acoustic liner, the lower the sound frequency engineers can measure accurately.

Construction workers will install a dense acoustic lining in the NFAC's 40-by-80-foot test section walls, floor and ceiling. The insulation material comes in wedges 42 inches deep and about 4 feet square to cover that entire area. The new lining is similar to the spun Fiberglas commonly used to insulate houses.

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Project design will take the next 2 years. Construction is scheduled to begin in the spring of 1995. During construction, the test section will shut down for more than a year.

Workers also will modify the wind tunnel's motor generators to let engineers send more electric power to the main drive motors. "Normally, we rotate the main drive motors at 180 rpm, but now we will be able to rotate them at half that speed and cut the noise levels by 75 percent, " Allmen said. "This major reduction in background noise will allow us to reach speeds of 100 knots (105 mph) quietly."

Allmen noted that the tunnel's net operational costs will not rise after the project is complete. "The modification costs are about one-twentieth of the cost of building a new facility, which would cost more than $500 million," he said.

- end-

NASA News

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Aug. 3, 1994

Release 94-12

DANA PURIFOY NEWEST RESEARCH PILOT AT NASA DRYDEN

Dana D. Purifoy, a former Air Force test pilot, has joined NASA as an aerospace research pilot at the Dryden Flight Research Center, Edwards, Calif.

Purifoy was an Air Force project pilot in the joint NASA/Air Force X-29 Forward Swept Wing research program conducted at Dryden from 1984 to 1991. His most recent assignment in the Air Force was flying U-2 aircraft as a production test pilot at Air Force Plant 42, Palmdale, Calif.

"Dana brings to Dryden a wealth of aeronautical test and research experience," said Dryden chief pilot Rogers Smith. "He has an extensive background in a variety of disciplines and we are very fortunate and pleased that he is part of the NASA team at Dryden."

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The addition of Purifoy brings to six the number of aerospace research pilots assigned to the Dryden Flight Operations Branch. Among the projects flown at Dryden are supersonic laminar flow research with an F-16XL, high angle of attack research with a modified F-18, testing the X-31 Enhanced Maneuverability Fighter Aircraft by an International Test Organization, and research flights with the SR-71 that call for high-speed, high-altitude environments.

In addition to flying the X-29 at Dryden as an Air Force pilot, Purifoy also served as project pilot and joint test force director with the AFTI F-16 (Advanced Fighter Technology Integration/F-16) program, also located at Dryden.

Purifoy is a 1987 graduate of the French Test Pilot School, Epner, France, which he attended as an Air Force exchange pilot.

Before his assignments as project pilot on the X-29 and AFTI/F-16 aircraft, Purifoy was chief of the Academics Systems Branch at the Air Force Test Pilot School at Edwards. Prior to becoming a test pilot, he flew F-111 and F-16 aircraft in Great Britain and Germany. He has accumulated 3000 hours of flying time in his career.

Purifoy, born in Pittsburgh, Pa., Sept. 13, 1955, began his flying career when he entered Air Force pilot training in 1978 after graduating with honors from the University of Michigan with a master of science degree in aerospace engineering. He received a bachelor of science degree in aerospace engineering (Summa Cum Laude) a year earlier.

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News Release

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For Release

May 19, 1995

RELEASE: 95-73

REVIEW TEAM PROPOSES SWEEPING MANAGEMENT, ORGANIZATIONAL CHANGES AT NASA

An internal NASA review team has produced proposals ~~to~~ enable the agency to meet the tough funding targets set by the Administration in the 1996 budget, Administrator Daniel S. Goldin said today. The proposals include sweeping management and organizational changes to cut spending an additional $5 billion by the end of the decade.

"I'm pleased with what I've seen so far," Goldin said. "We've found ways to streamline operations, reduce overlap, and significantly cut costs without cutting our world-class space and aeronautics programs. We have much hard work before us, but I believe a stronger and more efficient NASA will emerge."

The internal review does not propose closing any of the agency's ten major field centers, or shutting down any major programs. Goldin said he is determined to cut infrastructure at the Agency by reducing jobs, facilities, and administrative overhead, rather than terminating core science, aeronautics, and exploration programs. However, Goldin warned that further deep budget cuts now under consideration in Congress would threaten the survival of some NASA centers and major Agency programs.

"Reaching the levels in the Administration budget was an incredibly difficult task," Goldin said. "The deeper cuts Congress is contemplating simply go too far, and I am committed to fighting them."

"NASA was already in the process of taking a $35 billion (31%) cut over five years when the President asked us to cut an additional $5 billion. This is an agency designed to operate with a $22 billion budget annually, and we'll be at $13 billion by the end of the decade under the Administration budget," Goldin said.

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"The American public wants a leaner, more efficient NASA, and we're prepared to meet that challenge. But they also want and deserve a NASA that maintains our nation's leadership in space exploration, aeronautics, science, and technology," he said.

The internal review, known as the "Zero-Base Review," proposes streamlining functions at the NASA centers, so each installation becomes a "center of excellence," concentrating on specific aspects of NASA's mission. At the same time, the proposed changes would reduce overlap and consolidate administrative and program functions across the Agency.

Under the review team's findings, NASA's total civil service employment levels would be cut to approximately 17,500 by the year 2000. This is the lowest level of civil servants at NASA since 1961. In addition, the budget reductions would cut an estimated 25,000 contractor personnel. The actual number and distribution of contractor job losses Agencywide would be determined by future business decisions made by the contractors.

The review team proposals will be assessed through the summer months and then become part of the Agency's Fiscal Year 1997 budget, due to be submitted to the Office of Management and Budget later this year. Goldin began the review last September following guidelines issued by the National Performance Review, a Government-wide effort headed by Vice President Gore to streamline executive agencies. The NASA study intensified in January to meet the President's budget reduction targets.

Zero-Base Review Operating Guidelines

In performing the study, the Zero-Base Review Team adopted the following operating guidelines.

- Each field center will have a primary mission to reflect its role in a strategic enterprise. NASA's strategic plan has established a framework for managing the Agency by concentrating key activities into "strategic enterprises." The five strategic enterprises are Mission to Planet Earth, Aeronautics, Human Exploration and Development of Space, Space Science, and Space Technology.

- Full program costs, including overhead as well as direct costs, will be identified and managed more effectively.

- Only Civil Servants, Jet Propulsion Laboratory employees, and employees of the new institutes will perform in-house science, research and engineering.

- Aerospace operations, including the Space Shuttle, will be performed by NASA contractors.

- Outsourcing and commercial services will be maximized.
- Agency activities and operations will be standardized to the maximum extent possible and commercially available products will be used as appropriate.

Actions Taken/Decisions Made

As part of its reinvention process, NASA has already made a number of decisions to reduce costs and achieve maximum efficiency. Among them:

- NASA has discontinued construction of a Space Shuttle solid rocket motor nozzle fabrication and refurbishment facility at Yellow Creek, MS. The move will save between $450 and $500 million through the year 2012.
- NASA will consolidate the Earth Observing System Data and Operations System function for the first EOS spacecraft at White Sands, NM. This move will save up to $30 million through the year 2000.
- NASA will consolidate software independent verification and validation functions at Fairmont, WV.
- Through a series of management actions, including two employee buyouts, NASA has substantially reduced total personnel. The two buyouts resulted in a reduction of Civil Service staffing by more than 2,600. Other factors, including attrition, have brought total Civil Service full-time staffing levels at NASA from 24,030 in January 1993 to 21,060 in April 1995.
- In line with the Administration's goals of reducing Washington headquarters staffing, the NASA Headquarters workforce has been reduced by 400 employees from January 1993 to April 1995, a 20 percent reduction. Headquarters is on track for an overall 50 percent reduction in personnel.
- Support service contract costs at NASA Headquarters have been reduced significantly. Staffing has been reduced by approximately 25 percent and total costs for support contracts are down approximately 33 percent for an annual savings in excess of $50 million. Similar reviews of support service contracts are underway at each of the NASA centers.
- NASA has canceled approximately $60 million in spending on custom software for a financial management system in favor of using less expensive, off-the-shelf technology.
- Each field center will be assigned a clearly defined mission, structured along a series of strategic enterprises and functional responsibilities. See the attached "Center Roles and Responsibilities," for additional details.

- Each NASA center, in self-assessments done for the Zero-Base Review, has identified a series of cuts and cost-saving measures. Those cuts will be included in the formulation of NASA's FY 1997 budget submittal.

Further Actions Under Consideration

A number of additional measures proposed by the Zero-Base Review Team are being provided as guidelines for the 1997 budget. These include:

- Reassigning and consolidating functional management responsibilities (such as personnel management, payroll and other administrative functions) to designated lead centers, a move that would reduce overlap. This approach would allow the Agency to take advantage of advanced technologies to deliver the same services for less money.

- Consolidating wide area networks at a single location and contracting for information and communications services. Currently, each NASA center has significant resources devoted to information systems infrastructure.

- Eliminating some administrative aircraft, and consolidating research aircraft operations at a single location.

- Transitioning the management of some science programs to institutes located on or near NASA sites. These institutes would be operated by a university, private industry, or a teaming arrangement.

- Restructuring the Space Shuttle program and preparing it for contractor consolidation and privatization.

Attachment

-end-

Center Roles and Responsibilities

One of the most important management changes being made by NASA is the identification and implementation of carefully defined roles for each field installation. NASA's senior management already has agreed to a specific mission and area of excellence for each Center. One lead Center will manage everything within its area of excellence. Also shown below are proposed realignments that will be reflected in the Agency's FY 1997 budget guidance. Detailed analysis will occur throughout the summer as part of that process.

Under the review team's findings, NASA's total civil service workforce would be cut to approximately 17,500 by FY 2000. The actual number and distribution of contractor job losses Agencywide would be determined by future business decisions made by the contractors. The job estimates below are accurate within 15 percent.

Ames Research Center
Mountain View, CA

Mission:	Airspace Operations Systems and Astrobiology
Center of Excellence:	Information Technology
Proposed Realignments:	Establish a science institute for astrobiology; retain core in-house aeronautics research capability; consolidate management of aeronautical facilities with Langley Research Center facilities; transfer Moffett airfield; transfer aircraft to Dryden Flight Research Center.
Job Changes by FY 2000:	Estimated Civil Service Losses: -300 Estimated Contractor Losses: -1,140 Percentage of FY 1996 Baseline: -35%

Dryden Flight Research Center
Edwards, CA

Mission:	Flight Research
Center of Excellence:	Atmospheric Flight Operations
Proposed Realignments:	Assume flight operations management of all aircraft except those in support of the Space Shuttle.
Job Changes by FY 2000:	Estimated Civil Service Gains: +200 Estimated Contractor Gains: +100 Percentage of FY 1996 Baseline: +32%

Goddard Space Flight Center
Greenbelt, MD

Mission:	Earth Science/Physics and Astronomy
Center of Excellence:	Scientific Research
Proposed Realignments:	Transfer Goddard Institute for Space Studies to a university/consortium; consolidate management of the Suborbital program at Goddard; reduce cost of Wallops Flight Facility operations and investigate additional cost-sharing opportunities; increase partnerships with NOAA; consolidate management of communications infrastructure at Johnson Space Center; privatize space science data archiving and distribution; reduce in-house spacecraft development; transfer aircraft to Dryden Flight Research Center.
Job Changes by FY 2000:	Estimated Civil Service Losses: -550 Estimated Contractor Losses: -2,650 Percentage of FY 1996 Baseline: -28%

Jet Propulsion Laboratory
Pasadena, CA

Mission:	Planetary Science and Exploration
Center of Excellence:	Deep Space Systems
Proposed Realignments:	Further study of proposal to commercialize ground tracking of low-Earth orbit spacecraft; reduce in-house spacecraft development.
Job Changes by FY 2000:	Estimated Civil Service Losses: N/A Estimated Contractor Losses: -1,250 Percentage of FY 1996 Baseline: -22%

Johnson Space Center
Houston, TX

Mission:	Human Exploration and Astro Materials
Center of Excellence:	Human Operations in Space
Proposed Realignments:	Transfer management of White Sands Test Facility to Stennis Space Center; assume management of communications infrastructure; establish institutes for biomedical and planetary science; streamline engineering and facilities (no personnel transfers).
Job Changes by FY 2000:	Estimated Civil Service Losses: -500 Estimated Contractor Losses: -2,750 Percentage of FY 1996 Baseline: -21%

Kennedy Space Center
Kennedy Space Center, FL

Mission/Center of Excellence:	Space Launch
Proposed Realignments:	Shuttle contractor consolidations; assume management of Atlas-class expendable launch vehicles from Lewis Research Center.
Job Changes by FY 2000:	Estimated Civil Service Losses: -1,150 Estimated Contractor Losses: -2,000 Percentage of FY 1996 Baseline: -24%

Langley Research Center
Hampton, VA

Mission:	Airframe Systems, Aerodynamics, and Atmospheric Science
Center of Excellence:	Structures and Materials
Proposed Realignments:	Provide program analysis and evaluation function for Agency; transition atmospheric science to an institute; transfer aircraft to Dryden Flight Research Center.
Job Changes by FY 2000:	Estimated Civil Service Losses: -200 Estimated Contractor Losses: -800 Percentage of FY 1996 Baseline: -21%

Lewis Research Center
Cleveland, OH

Mission:	Aeropropulsion
Center of Excellence:	Turbomachinery
Proposed Realignments:	Transfer Atlas-Class expendable launch vehicle management to Kennedy Space Center; retain Plumbrook on a fully-reimbursable basis; establish an institute for microgravity and space power; close the rocket engine test facility; transfer aircraft to Dryden Flight Research Center.
Job Changes by FY 2000:	Estimated Civil Service Losses: -400 Estimated Contractor Losses: -1,100 Percentage of FY 1996 Baseline: -33%

Marshall Space Flight Center
Huntsville, AL

Mission:	Transportatión Systems Development and Microgravity
Center of Excellence:	Space Propulsion
Proposed Realignments:	Further study of proposed transfer of payload operations to Johnson Space Center; further study of establishing an institute for science, including hydrology; mothball the Technology Test Bed; provide technical excellence in large optical systems/mirrors.
Job Changes by FY 2000:	Estimated Civil Service Losses: -650 Estimated Contractor Losses: -1,350 Percentage of FY 1996 Baseline: -30%

Stennis Space Center
Stennis Space Center, MS

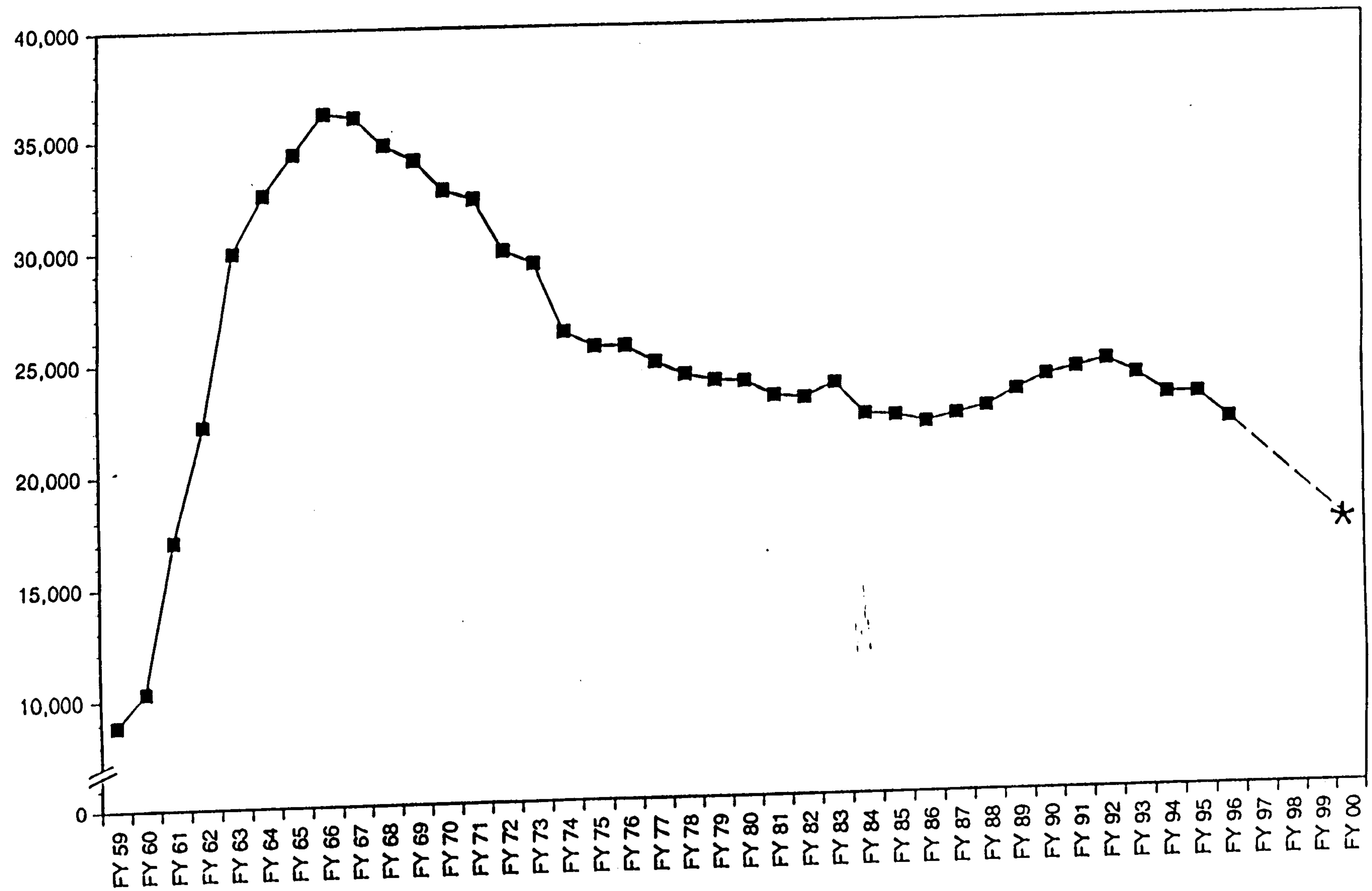
Mission/Center of Excellence:	Propulsion Test
Proposed Realignments:	Assume management of White Sands Test Facility from Johnson Space Center; manage all future rocket propulsion testing; pursue National Propulsion Test Alliance.
Job Changes by FY 2000:	Estimated Civil Service Losses: 0 Estimated Contractor Losses: -100 Percentage of FY 1996 Baseline: -9%

NASA Headquarters
Washington, DC

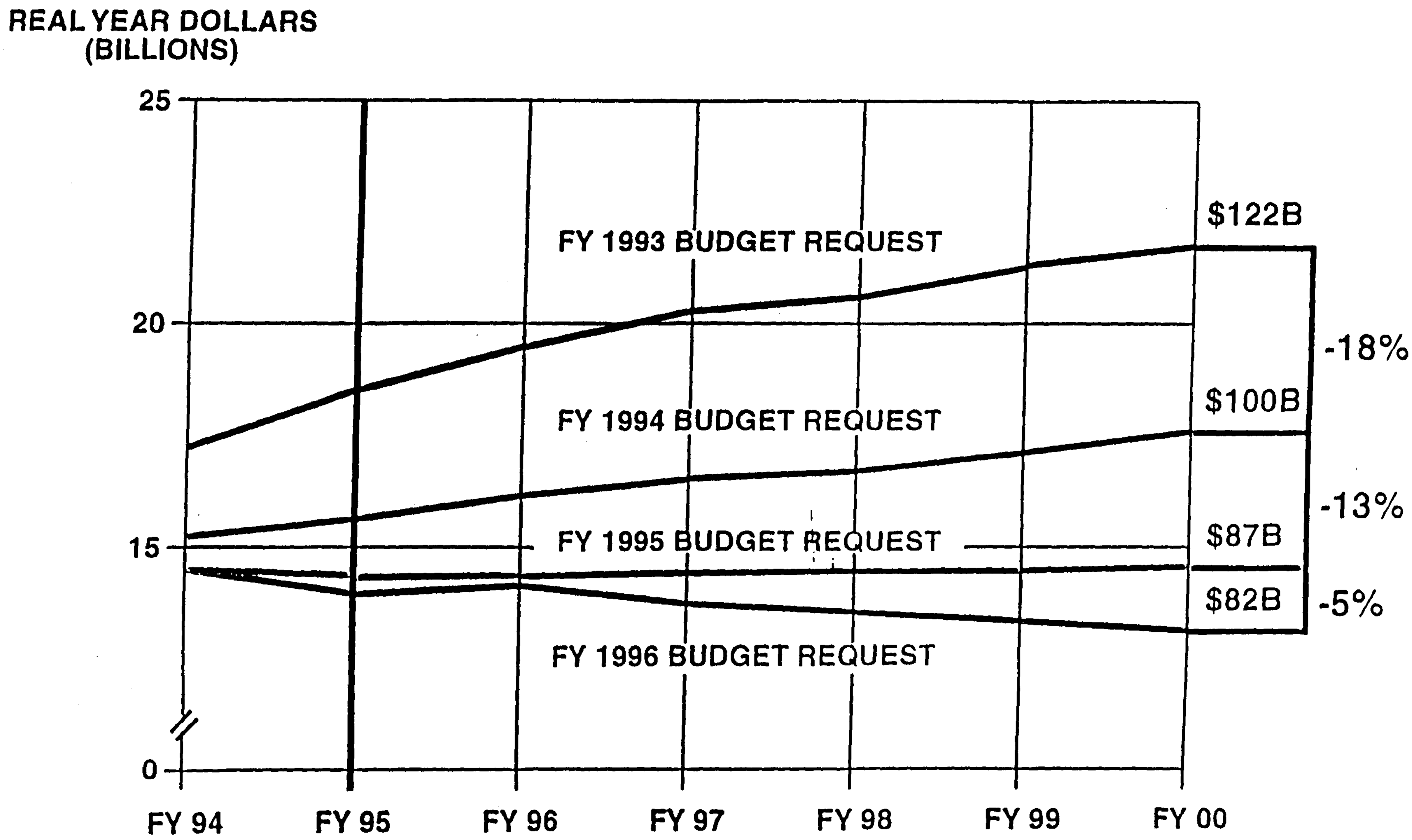
Mission/Center of Excellence:	Corporate office
Proposed Realignments:	Reduce FY 1993 staffing level by 50 percent in accordance with National Performance Review guidelines; align selected program and functional responsibilities to field centers.
Job Changes by FY 2000:	Civil Service Losses: -450 Estimated Contractor Losses: -500 Percentage of FY 1996 Baseline: -30%

Additionally, two areas not represented in the Center listings above will also provide significant workforce reductions. The Zero-Base Review anticipates that by consolidating information and communications systems across NASA, 1,800 contractor jobs will be eliminated Agencywide by FY 2000. Further, it is anticipated that by moving to a single prime contractor on the Space Shuttle program, another 5,000-10,000 contractor jobs will be eliminated Agencywide by FY 2000.

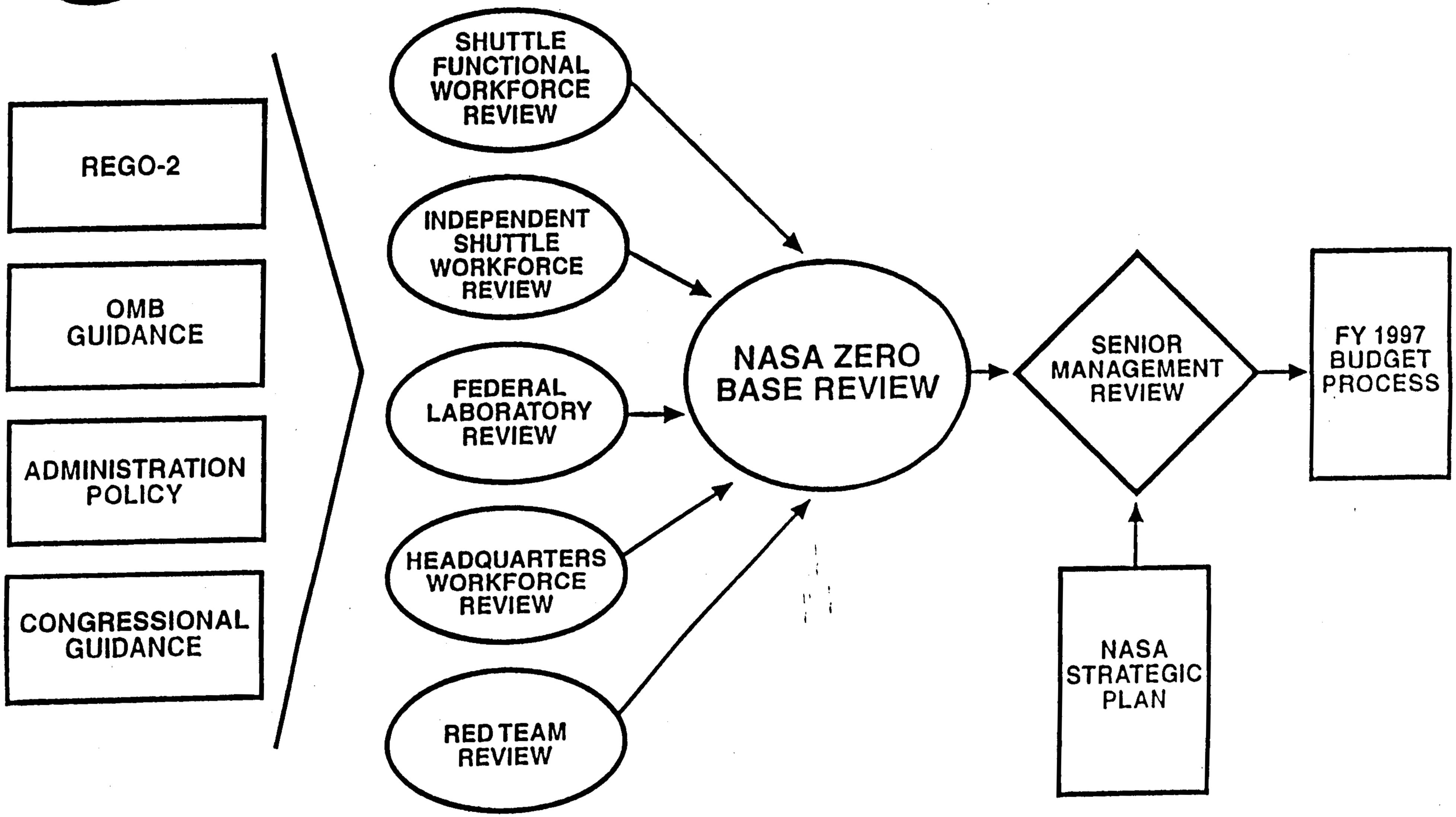
CIVIL SERVICE EMPLOYMENT



FY 1996 PRESIDENT'S BUDGET



NASA REINVENTION PROCESS



Categories of Reductions*

• Efficiencies	$0.7
• Restructuring	$1.3
• Privatization	$1.3
• Commercialization	$0.6
• Outsourcing	$0.4
• Deregulation	$0.0 - $0.5
• Performance-based Contracting	$0.1 - $0.2
• TOTAL	$4.4 - $5.0

*Estimated Savings, $B

NASA News

National Aeronautics and
Space Administration

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For Release:
March 7, 1997

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RELEASE No: 97-09

FLIGHT TESTS VALIDATE SMART SKIN ANTENNA

A new antenna system which could revolutionize airborne communications achieved remarkable results in its first flight tests at NASA's Dryden Flight Research Center, Edwards, Calif.

Tests of the "Smart Skin" antenna system aboard Dryden's F/A-18 Systems Research Aircraft (SRA) demonstrated a five-fold increase in voice communication range and a substantial improvement in the quality of radio transmissions from the aircraft when compared with transmissions from the F/A-18's standard blade antenna.

Initially sponsored by the U.S. Air Force's Wright Laboratory, the new technology was jointly developed by Northrop-Grumman Corporation and TRW's Avionics Systems Division using internally-generated company funds. Two test flights were flown recently with the Smart Skin antenna embedded in a specially-built tip mounted on the SRA's right vertical stabilizer.

Joel Sitz, Dryden's F/A-18 SRA project manager, said the new antenna system has the potential to greatly improve the range and quality of air-to-air and air-to-ground communications. It could also result in improved maintainability, reduced aerodynamic drag as external antennas are removed and a smaller radar signature for tactical military aircraft, he added. The concept has potential applications not only to military and commercial aircraft but also to "smart" automobiles and other forms of transportation requiring high-efficiency communications capabilities.

Allen Lockyer, Smart Skin Antenna program manager for Northrop-Grumman's Integrated Product Team, called the development a significant breakthrough in antenna system structural integration technology. Lockyer said the system is electrically as well as physically connected to the airframe, making the aircraft skin operate as an antenna along with the antenna structure itself.

During the two flight tests of the Smart Skin Antenna, NASA Research Pilots C. Gordon Fullerton and Mark Stucky flew circular flight patterns about 10 miles in diameter while flight test engineers Eddie Zavala and Dave Webber transmitted signals from the aircraft's radios at frequencies of 33 and 65 mhz. to a receiving station at Edwards Air Force Base. The two Dryden pilots flew the circles at bank angles of 0, 15, and 30 degrees in order to evaluate the range, gain and radiation patterns of both the Smart Skin and the standard blade antennas. The patterns were first flown at a distance of about 35 miles and then repeated at about 20 miles from the ground receiving station.

Dr. Allan Goetz, TRW's Smart Skins program manager, said the Smart Skin antenna demonstrated a 15 to 25-decibel improvement in signal-to-noise ratio at the lower frequency. "That equates to more than a

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five-fold increase in voice communication range and a substantially more symmetric radiation pattern," Goetz said.

The concept was first broached by the Air Force in the late 1980's. Its development came with several technological breakthroughs recently achieved by the TRW/Northrop-Grumman team.

"The idea of using the tail as an antenna had been attempted before," Lockyer explained. "The problem has been choosing the right materials and design to make it happen. You need materials whose properties will give you both electrical and structural performance at the same time."

Lockyer said some of the new thermosets and core materials now becoming available combine low-loss, high-conductivity electrical properties which stimulate surface current flow, along with high strength to survive twin-tail buffet loads.

"Some said this test wouldn't work, but flight research has proved them wrong," said Sitz.

Smart Skin antenna systems not only have the potential for enhanced voice communications and higher-quality navigation, but could also lead to a 65 percent reduction in airframe structural cutouts for external antennas and a weight savings of 250 to 1,000 lbs. per aircraft.

The Smart Skin antenna hardware developed by engineers at TRW Avionics Systems Division in San Diego was integrated into the custom vertical stabilizer end cap by Northrop-Grumman using production tooling at the firm's Pico Rivera, Calif., facility. The proof-of-concept test article was installed on the right vertical fin of NASA's F/A-18 SRA by Dryden technicians.

"The team did an excellent job of getting the experiment installed and checked out," Sitz said. "We're happy that we can make Dryden's Systems Research Aircraft available as a testbed to industry. It makes it possible to validate these concepts."

-- NASA --

NOTE TO EDITORS: Several photos are available from the NASA Dryden External Affairs Office to support this release, among them:

EC97-43950-1	F/A-18 vertical fins with Smart Skin antenna mounted.
EC97-43950-2	NASA Dryden technician checks out antenna on F/A-18 vertical fin.
EC97-43950-3	Smart Skin antenna end cap on F/A-18 vertical fin.
EC97-43950-4	(Vertical) F/A-18 right vertical fin with Smart Skin antenna.
EC97-43950-5	F/A-18 vertical fins with Smart Skin antenna mounted, NASA hangar.
EC97-43958-1	F/A-18 SRA in flight with Smart Skin antenna on right vertical fin

These photos will also be available on the Internet under NASA Dryden Research Aircraft Photo Archive, Dryden News and Feature Photos, URL:

http://www.dfrc.nasa.gov/PhotoServer

NASA Dryden news releases are also available on the Internet at:

http://www.dfrc.nasa.gov/PAO/PressReleases/index.html

NewsRelease

National Aeronautics and
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For Release

March 24, 1997

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RELEASE: 97-53

NASA SELECTS MICROCRAFT, INC. TEAM TO FABRICATE HYPERSONIC VEHICLES

NASA has selected a team led by MicroCraft, Inc., Tullahoma, TN, to fabricate a series of small, unpiloted experimental vehicles that will fly up to ten times the speed of sound. The five-year project, known as Hyper-X, will demonstrate hypersonic propulsion technologies.

When the Hyper-X flies, it will be the first time a non-rocket engine has powered a vehicle in flight at hypersonic speeds -- speeds above Mach 5, equivalent to about one mile per second or approximately 3,600 miles per hour at sea level. A booster rocket will carry each experimental vehicle to its flight-test speed and altitude, where it will be launched to fly under its own power.

The cost-plus-incentive fee contract is worth an estimated $33.4 million over the next 55 months. It specifies that the first of four Hyper-X vehicles is to be delivered in time for the first scheduled flight early in fiscal year 1999.

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Team members working with MicroCraft will be Boeing North American, Inc., Seal Beach, CA; GASL, Inc., Ronkonkoma, NY; and Accurate Automation Corp., Chattanooga, TN.

The Hyper-X project is conducted jointly by the Langley Research Center, Hampton, VA, and the Dryden Flight Research Center, Edwards, CA. Langley will manage the overall project while Dryden will conduct the flight tests.

"We're embarking on an ambitious series of Hyper-X flights to expand the boundaries of aeronautics and develop new technologies for space access," said Daniel S. Goldin, NASA Administrator. "Most impressively, these flights will begin less than two years from now. Under old ways of doing business it might have taken ten years to reach flight tests."

MicroCraft will be responsible for fabrication and flight-test support. This will include not only the four research vehicles but also one research vehicle-to-booster adapter for mating of the research vehicles to the nose of an expendable booster rocket. Each vehicle will be approximately 12 feet long with a wing span of about five feet.

"We are ready to prove this technology -- to be the first to fly an air-breathing vehicle at hypersonic speeds," said NASA Langley's Vince Rausch, the Hyper-X project manager.

Program managers plan to demonstrate hydrogen-powered, "air-breathing" propulsion systems that could ultimately be applied in vehicle types ranging from hypersonic aircraft to reusable space launchers.

A rocket carries its own oxygen for combustion. An air-breathing vehicle, the experimental Hyper-X, will burn oxygen in the air scooped from the atmosphere. Because of this, air-breathing hypersonic vehicles should carry more payload and/or offer longer range than equivalent rocket-powered systems.

Four flights are planned -- one each at Mach 5 and 7 and two at Mach 10. The Mach 7 flight comes first. The flight tests will be conducted within the Western Test Range off the coast of southern California.

Each Hyper-X vehicle will ride on the first stage of an Orbital Sciences Corp., Dulles, VA, booster rocket, which will be launched by the Dryden B-52. For each flight, the booster will accelerate the Hyper-X research vehicle to the test conditions (Mach 5, 7 or 10) at approximately 100,000 feet. There, it will separate from the booster and fly under its own power and preprogrammed control.

Ground tests and analyses of both vehicle and engine will be performed prior to each flight in order to compare flight and ground-test results. In addition, the Hyper-X Mach 7 and 5 vehicles will be tested prior to flight in Langley's 8-Foot High Temperature Wind Tunnel. The vehicles, with a fully operating ramjet/scramjet propulsion system, will be put through tests in the tunnel simulating many, but not all, Mach 7 and 5 flight conditions

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A ramjet operates by subsonic combustion of fuel in a stream of air compressed by the forward speed of the vehicle itself. In a conventional jet engine, the compressor section (the fan blades) compresses the air.

A scramjet (supersonic-combustion ramjet) is a ramjet engine in which the airflow through the whole engine remains supersonic. Scramjet technology is challenging because only limited testing can be performed in ground facilities. Hyper-X takes the next essential step in developing hypersonic, air-breathing technology.

Images of the Hyper-X vehicles and additional information can be obtained at the following URLs:

http://lisar.larc.nasa.gov/LISAR/BROWSE/hyperx.html

or

http://oea.larc.nasa.gov/

NOTE TO EDITORS: Photos to accompany this release are available by calling the Langley Research Center, Hampton, VA, or the Dryden Flight Research Center, Edwards, CA, at the numbers listed above.

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NASA News

National Aeronautics and
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March 27, 1997

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RELEASE: 97-11

STATE OF THE ART SOLAR-POWERED AIRCRAFT TO BE DEVELOPED

Aeronautical engineers in Southern California are developing an aircraft -- called Centurion -- which they believe will push solar-powered aircraft concepts literally to new heights.

Engineers for AeroVironment, Inc., Simi Valley, Calif., are designing the aircraft to fly at 100,000 feet (30 kilometers) altitude. The company is developing this concept as a member of NASA's Environmental Research Aircraft and Sensor Technology (ERAST) program, which is sponsored by NASA's Dryden Flight Research Center, Edwards, Calif.

Like its predecessor, the AeroVironment-developed Pathfinder, the Centurion will be an ultralight flying wing with multiple electric motors along its wingspan, powered by solar cells spread across the wing's upper surface. Centurion's wingspan, however, will be more than twice that of Pathfinder.

According to John Del Frate, Dryden's ERAST deputy project manager, recent flight tests of a quarter-scale battery-powered model of the craft at El Mirage Dry Lake in Southern California's high desert have answered questions about the Centurion's aerodynamics and stability.

"We saw it fly, and it flew quite well," said Del Frate. "It has given us confidence that we can go ahead with the design of the full-scale vehicle."

"We'll take the data from these flights, and incorporate them into the design of the full-scale proof-of-concept vehicle," added Bill Parks, Centurion's chief designer and operations manager for the subscale flight tests.

"We're essentially scaling the aircraft up, designing new airfoils that are more efficient for high altitudes and optimizing the systems," said Rik Meininger, AeroVironment's Centurion project manager.

-more-

Both cost and efficiency considerations have driven building and flying a subscale model, then a full-scale prototype before developing the final solar-powered Centurion.

"We find that we can make configuration changes very quickly and very cost-effectively, then immediately test it and come back and change if necessary," he said. "It allows us, in a very short period of time, to get a lot of test data, and also do the risky things that normally you wouldn't want to do with a full-scale aircraft. By the time we get to the final aircraft stage, we should only be doing minor changes and fine-tuning for optimization," Meininger said.

The final solar-powered Centurion will be designed to reach an ultra-high altitude of 100,000 feet (30 kilometers) for a relatively short duration--about two hours--while carrying a small 200-pound (91 kilogram) payload of scientific sensors. The full-scale Centurion will span between 210 and 240 feet (63 to 72 meters).

The subscale Centurion spans 62.5 feet (18.75 meters) but has only a two-foot (60 centimeter) chord. The straight wing is in five "spanwise" sections that are supported by four underwing pods. The model weighs in at a feathery 25 pounds (11.25 kilograms), giving the kite-like craft a wing loading of only 2/10ths of a pound per square foot and a design airspeed of about 11 knots (12.5 miles per hour).

Centurion officials had a chance to assess the lightweight craft's stability during a planned flight in adverse conditions. Although turbulence tossed the model around like a cork, causing the wing to flex significantly, remote test pilot Wyatt Sadler was able to maintain safe altitude by adding differential power. After a short duration flight, he brought the craft to a safe landing. The model flew more than an hour and 40 minutes on 13 flights.

The Centurion is one of several unpiloted aircraft being developed by an alliance between NASA and several small aeronautical development companies and universities under NASA's ERAST program. The goal of the ERAST program is to develop aeronautical technologies that will lead to development of a new family of high-flying remotely piloted aircraft for scientific missions.

Flight testing of the battery-powered full-scale proof-of-concept aircraft will begin at Dryden this fall.

--NASA --

NOTE TO EDITORS: A number of photos are available from NASA Dryden External Affairs Office to support this release, among them: Centurion sub-scale flight tests EC97-43965-3, EC97-43965-6, EC97-43965-7, EC97-43965-8, EC97-43965-9, EC97-43965-20
Photos also are available on the Internet under NASA Dryden Research Aircraft Photo Archive, Dryden News and Feature Photos, URL:
http://www.dfrc.nasa.gov/PhotoServer

NASA Dryden news releases also are available on the Internet at:
http://www.dfrc.nasa.gov/PAO/PressReleases/index.html